

# 9-11 SCIENCE REPORT

By Dr. Stefan G. E. Grossmann

formerly <http://www.gallerize.com>

## APPENDIX I: PENTAGON 9-11: TWO EXPLOSION SITES Per: May 08, 2018

### Executive Summary:

1. “On September 11, 2001, flight AA77 (a Boeing 757-223) crashed into the western side of the Pentagon (DoD, Arlington County, VA) at 09:37 a.m.” That allegation is part of the questionable standard narrative of the U.S. government about 9-11.
2. More than sixteen years after the event, massive evidentiary questions have arisen as to the veracity of that key government allegation. This Report, firstly, outlines the argument history of the issue leading to the ongoing discourse by many concerned citizens.
3. Secondly, I propose that the “Pentagon crash” of 9-11 was an event of synthetic terror (W. Tarpley.) It was managed intentionally so as to make it hard to understand. Once the orchestrated mechanics of its confusion are made visible, the true nature of the Pentagon crash falls into place – it was an event designed to remain “hidden in plain sight”.
4. I contend that, by today, all the pieces of a semantic puzzle are on the table. It remains to put the puzzle pieces together in the right way so that a smooth and plausible picture of the Pentagon crash emerges.
5. In summary, there were two explosions at the Pentagon on the morning of 9-11:
  - (i) Before 08:48 a.m., a cruise missile approached the Pentagon facade coming more from the north and exploding in front of the facade, breaking some windows, blackening the facade, and leaving a pile of debris of one cruise missile engine and other debris. This was close to the firehouse, and seen from the cruise missile, was to the left of the helipad. The Arlington County fire department fought the resulting fires since before 08:48 a.m. on-site. The fire truck “Foam 161” was destroyed at c.09.37 a.m. by the second explosion.
  - (ii) When the second explosion occurred at c.09:37 a.m., the government declared that to be a crash of flight AA77. French Sipa news agency personnel, conveniently stationed at the Pentagon fence waiting for the explosion in order to photograph it, photographed the explosion, not of a plane storing its fuel in two lateral wing tanks. A security video was impounded by the FBI but released in 2007 by court order. It shows the relevant air space with no plane, and an explosion wrongly said to be AA77 hitting the Pentagon facade.



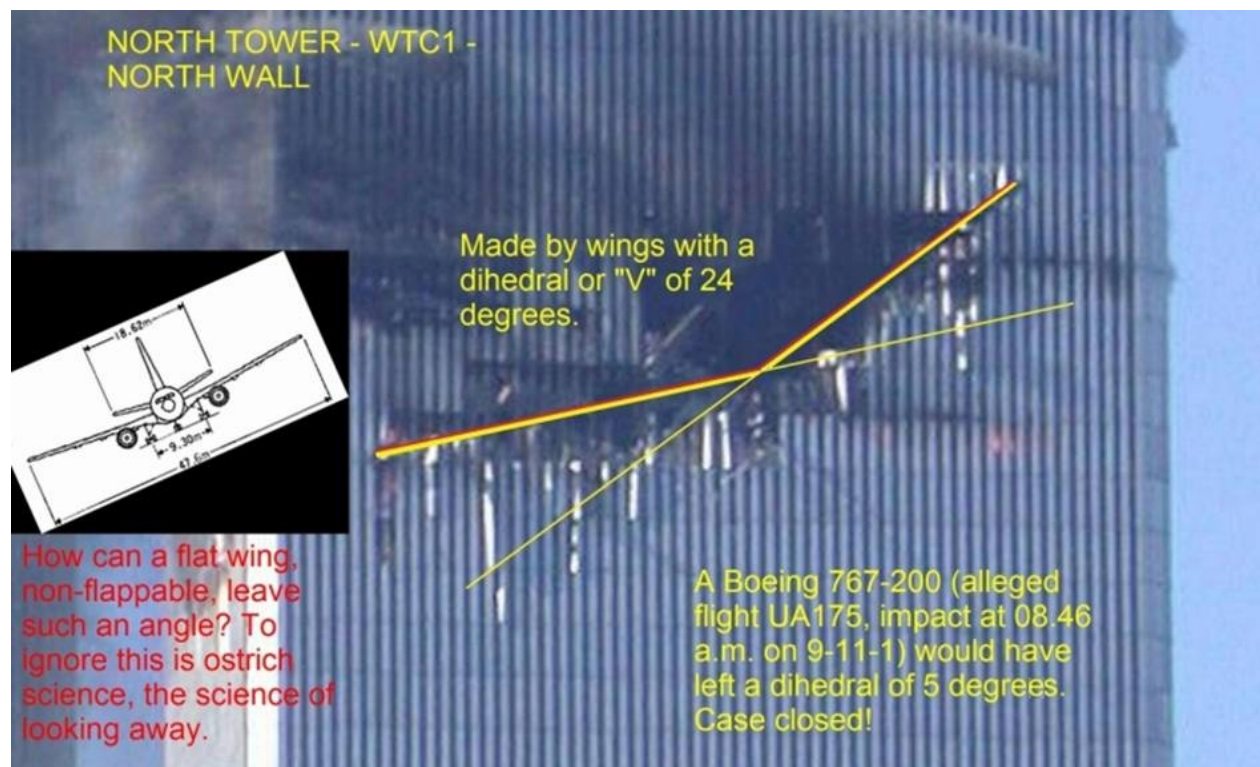


1. Please study the photographs shown on the foregoing page. The middle big one was taken by the French news agency Sipa. The four smaller photos are frames from two Pentagon security cameras, the frames being in succession (left bottom succeeding left top, right bottom succeeding right top).

The explosions' colours, shape and smoke on the Sipa photo don't match the Pentagon photos. The Pentagon videos are total forgeries showing a false reality that is compatible with the official "one single explosion only" allegation. The explosion location is distinctly limited, not allowing for the additional damage, smoke and fires to be seen in many other photos. Also, the Pentagon frames do not explain how the fire engine "Foam 161" could have been destroyed by flying debris.

2. Please also study the additional photos, and my notes written on some of them. Even this scant documentation makes it amply clear that not only was there sleight of hand, but, mainly, there was something important that happened before the alleged "flight AA77" allegedly crashed in the Pentagon.

There is much more evidence to the same effect. I have compiled a DVD ROM with data of 9-11. An example from the WTC is here:



The conclusion is that on 9-11, Americans were killed by Americans (inside the government). The existing government "investigations" and "reports" have had the purpose to cover up things. Much important evidence was hidden by the official "Commission". Their only job was damage containment but not the revelation of the truth.

**Evidence**

**World Trade Center**

**destroyed evidence**

aircraft  
 structural steel

**missing evidence**

bodies  
 building contents  
 gold  
 asbestos

**surviving evidence**

**photographs**

jet impacts  
 fires

destruction  
 dust clouds

Building 7  
 WTC 3, 4, 5, 6

Ground Zero  
 surroundings  
 construction

**videos**

**timelines**

**seismic records**

**persisting heat**

molten iron

**forensic metallurgy**

orange spout

**dust analysis**

thermitic residues  
 active thermitics

**gas emissions**

**eyewitness accounts**

oral histories  
 firefighter audiotape

**demolition admission**

**tower blueprints**

structural  
 electrical

**Pentagon**

**missing evidence**

Pentagon footage

**surviving evidence**

**photographs**

**CCTV video**

**eyewitness accounts**

Eric Bart compilation  
 anonymous compilation  
 large jetliner  
 moment of impact  
 explosives  
 other aircraft  
 approach details

**flights**

**destroyed evidence**

**missing evidence**

airport video

phone calls

call detail

cell phone calls

# Five Video Frames

## Video Frames Leaked in 2002 Show Moments of the Pentagon Attack

In March of 2002, five frames from a Pentagon surveillance camera became public, published by the *Associated Press*. The camera was positioned north of the section of the Pentagon's [west wall](#) destroyed on September 11th, and its field of view includes the destroyed section.

This was the only video footage capturing the seconds of the attack that had been made available to the public until May, 2006, when the Pentagon [released two video clips](#), both showing slightly more than three minutes at about one frame per second. One of the two clips contains the five frames, and the other is from a nearby camera.

The copies of the five frames on this page, which have been widely circulated on the Web, have greater horizontal cropping than glossy photographic prints of the frames provided by the AP. [Copies of the frames published by CNN](#) have higher resolution than these, and about the same horizontal cropping as the AP glossies, but have the date stamp on the bottom cropped off.

What do the frames show about the attack and its investigation or cover-up by authorities? This [analysis](#) suggests the answer is not the immediately obvious one.





black boxes  
flight data  
voice data  
air controllers  
bodies

surviving evidence  
passenger lists  
photographs  
eyewitness accounts  
Flight 93 transcript  
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page last modified: 2007-09-13

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destroyed evidence

flights

missing evidence

airport video phone calls black boxes

# Two Pentagon Videos

## Footage From Two Pentagon Security Cameras Showing Moments of Attack

On May 16, 2006, the Department of Defense released, through [JudicialWatch.org](#), footage from two cameras that captured portions of the [attack at 9:37](#) on the west side of the Pentagon. One of the two cameras was the source of the [five frames of video](#) leaked in 2002.

The two clips have the following approximate characteristics:









duration	impact time	frames per second
3:20	00:26	1
3:03	01:28	1









The videos were supplied in the form of Flash video clips. We extracted pairs of frames, one from each clip, for various times, to make the following table.

seconds from impact	frames	
-1		
0		
2		

		
3		
4		
5		
6		



		
7		
8		
9		
10		

		
12		
14		
17		
23		





page last modified: 2007-01-11

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A whole lot of eyewitnesses believe it was hit by a plane. A photo by [Keith Wheelhouse](#) shows what seems to be aluminum confetti all over the lawn.

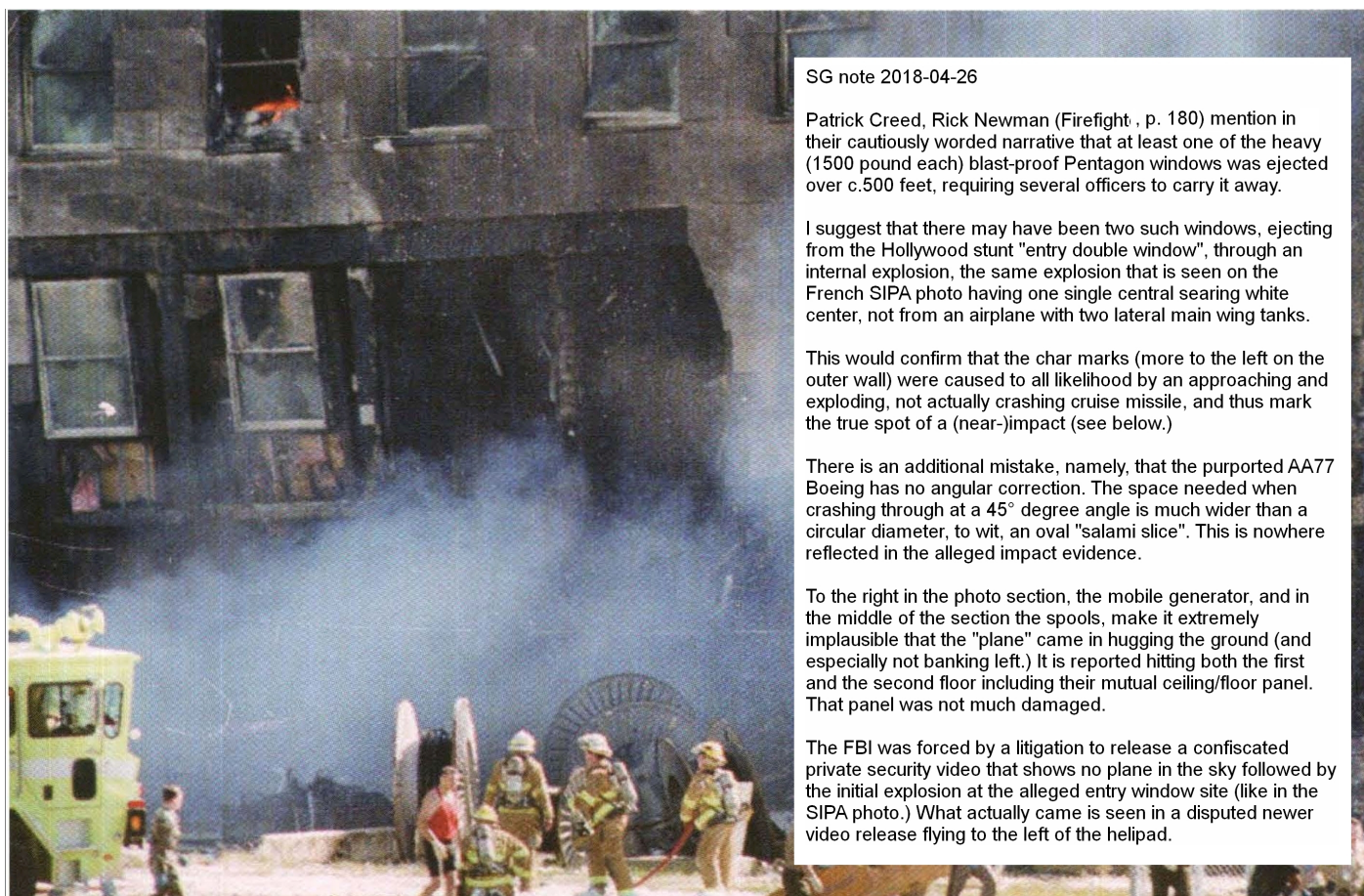








At 9:38 a.m. on September 11, only one fire crew, Foam 161 of the Fort Myer Fire Department, knew the exact location of the crash site. Captain Dennis Gilroy and his team were already on station at the Pentagon when Flight #77 slammed into it, just beyond the heliport. Foam 161 caught fire and suffered a flat tire from flying debris. Firefighters Mark Skipper and Alan Wallace were outside the vehicle at impact and received burns and lacerations. Recovering from the initial shock, they began helping victims climb out of the Pentagon's first floor windows. Captain Gilroy called the Fort Myer Fire Department, reporting for the first time the actual location of the crash.



SG note 2018-04-26

Patrick Creed, Rick Newman (Firefight , p. 180) mention in their cautiously worded narrative that at least one of the heavy (1500 pound each) blast-proof Pentagon windows was ejected over c.500 feet, requiring several officers to carry it away.

I suggest that there may have been two such windows, ejecting from the Hollywood stunt "entry double window", through an internal explosion, the same explosion that is seen on the French SIPA photo having one single central searing white center, not from an airplane with two lateral main wing tanks.

This would confirm that the char marks (more to the left on the outer wall) were caused to all likelihood by an approaching and exploding, not actually crashing cruise missile, and thus mark the true spot of a (near-)impact (see below.)

There is an additional mistake, namely, that the purported AA77 Boeing has no angular correction. The space needed when crashing through at a 45° degree angle is much wider than a circular diameter, to wit, an oval "salami slice". This is nowhere reflected in the alleged impact evidence.

To the right in the photo section, the mobile generator, and in the middle of the section the spools, make it extremely implausible that the "plane" came in hugging the ground (and especially not banking left.) It is reported hitting both the first and the second floor including their mutual ceiling/floor panel. That panel was not much damaged.

The FBI was forced by a litigation to release a confiscated private security video that shows no plane in the sky followed by the initial explosion at the alleged entry window site (like in the SIPA photo.) What actually came is seen in a disputed newer video release flying to the left of the helipad.



SG note 2018-04-26

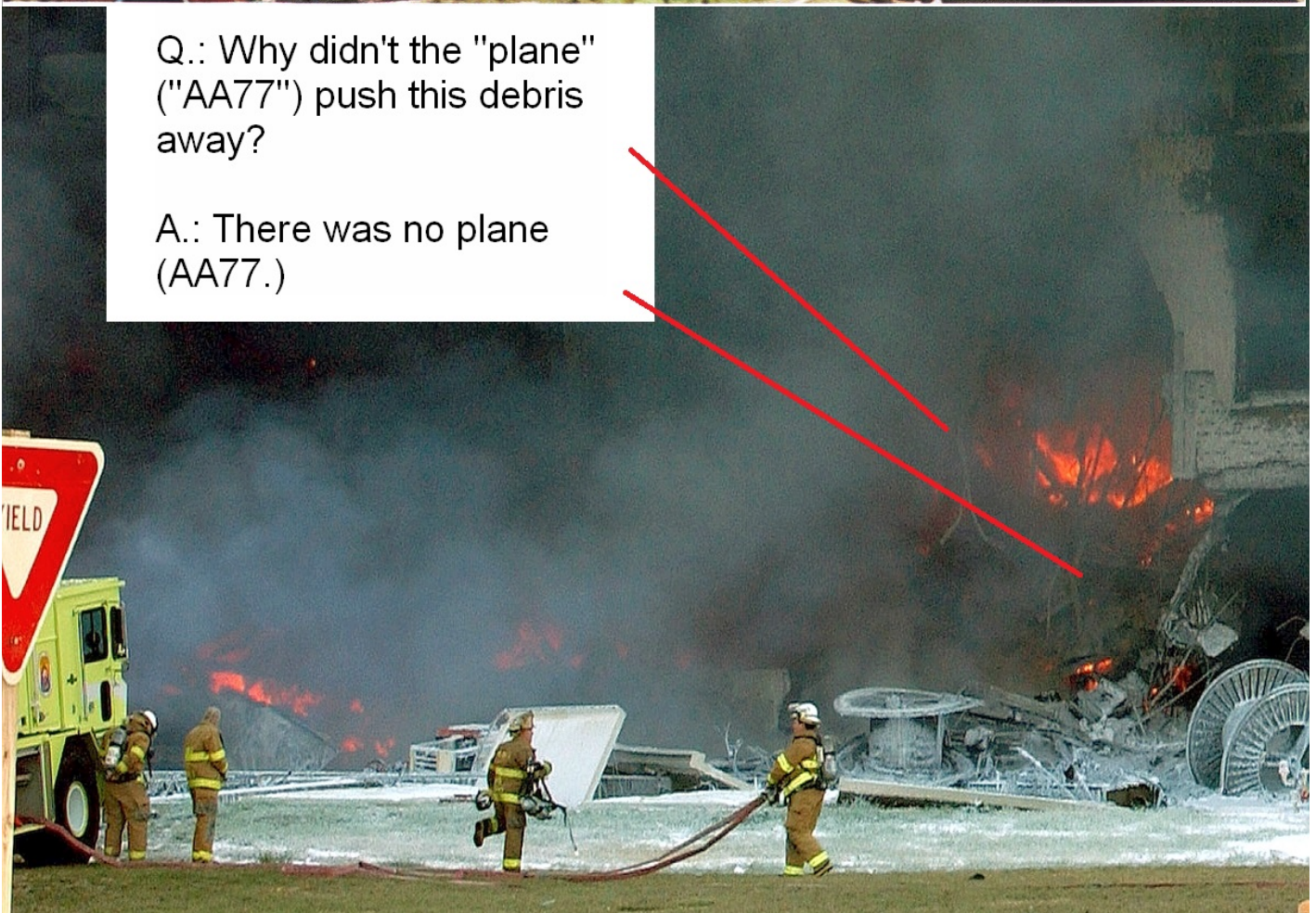
The elongated dust cloud featured thermal updraft. When the dust cloud cleared, the post-collapse frontal rubble field was seen on the ground to have emerged from the inside of the collapsed building segment.

This is one of the indications - a strong indication - that the building collapsed due to a controlled demolition using pre-planted internal explosives.

The Pentagon segment collapse is reported to have had a duration of c.10 seconds. That in itself is another strong indication of a controlled demolition.

Q.: Why didn't the "plane" ("AA77") push this debris away?

A.: There was no plane (AA77.)







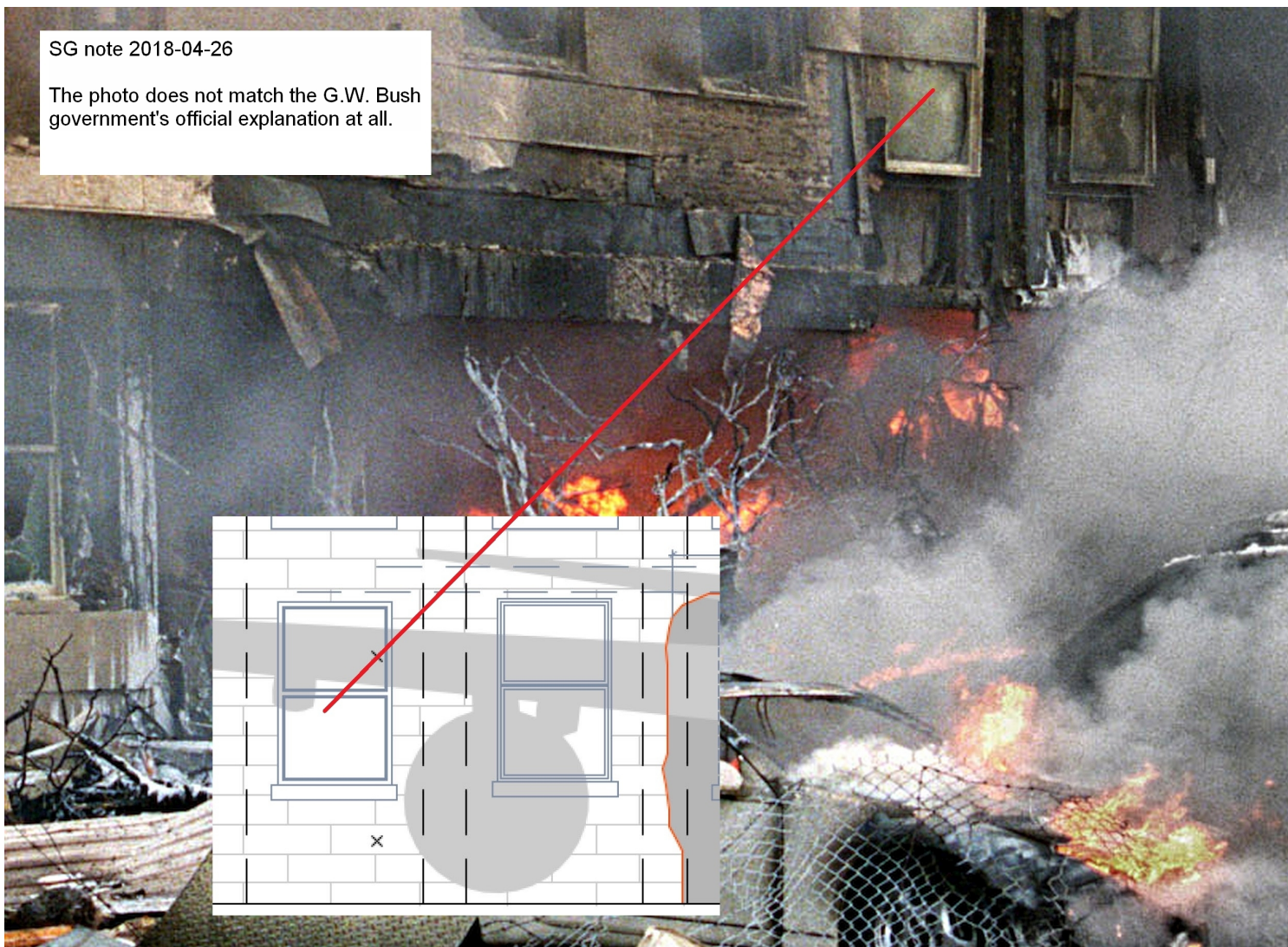
SG note 2018-04-26

From this camera angle, the "entry" cut at the right of the "in" window looks straight and rectangular like from an internal cutter charge.



SG note 2018-04-26

The photo does not match the G.W. Bush government's official explanation at all.







COLLAPSE  
RESCUE TEAM  
MONTGOMERY CO., MD

MONTGOMERY CO.  
MARYLAND  
FEMA URB  
SEARCH & T

FSS

FEMA URB  
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[https://www.youtube.com/watch?v=\\_wjOdhT3Yjg](https://www.youtube.com/watch?v=_wjOdhT3Yjg)

A privacy reminder from YouTube, a Google company



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## Leaked Video of Cruise Missile Hitting Pentagon on 9/11

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Leaked Video of Cruise Missile Hitting Pentagon on 9/11









# German Officials Claim:

## The FBI told them a Missile hit the Pentagon.

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After reading an article from Stefan Grossmann, I had noticed a claim that the FBI told German officials that the Pentagon was hit by a missile. I wanted confirmation for this so I wrote Mr. Grossmann and his reply is below.

I commend his efforts, and ask that anyone wanting to repost this, follow his request to include his name and website.

[www.gallerize.com](http://www.gallerize.com)

---

Hi Brad:

I was investing with a client in Kentucky in the internet project Gallerize.com since 1999 (with earlier preparations). The client was Spiro Armenis (client 1990-2002). I have the Armenis Papers on my web site, <http://www.gallerize.com>. They describe about four or five strands of epic story since 1988 (summaries of current historical events are always risky), about this:

- manipulating (we assume) the 670 mill \$\$ case Cramer v. Armenis in Florida since 1988
- Armenis, a DNC campaign financier (through Costas Gratsos/Onassis chief exec and Michael Dukakis - apparently in good faith, then later??) travelled to Libya, met Qaddafi, and Iraq, met trade minister, to make deals for billions of \$\$ to flow to Clinton/Gore - here: many travel papers since 1992 (many Clinton team names involved, a huge scandal including extortion bribery using the PanAm103/Lockerbie situation as a pretext)
- AIPC/MSUP 19,200 square kilometers Kazakhstan oil and gas exploration licence project
- founding of [www.gallerize.com](http://www.gallerize.com) as an art poster + news site
- the shutting down of [gallerize.com](http://www.gallerize.com) through a corrupt judge in a different Armenis litigation that did not involve the Gallerize ownership (me) (Jennifer B. Coffman of Charles Hayes and alleged Clinton sex fame) in March - May 2001 just in time before 9-11-1 flew in the door.

I lost a lot of money in this. Further, 11 (today's number I believe: 16) German citizens were murdered by the U.S. shadow government on 9 11 01 in the twin towers. After collecting facts and overcoming my natural scepticism of my explanation (which I believe I have further confirmed by my research, not least the valuable Armenis Papers), I started discussions with the German police - Polizeidirektion Frankfurt am Main, Abteilung Staatsschutz (Police Presidium Frankfurt am Main, department National Security Police).

I met with them on a day in January 2003 (I had falsely remembered in late 2002, but I have documentation in my files, including two of their business cards, a receipt for the Armenis Papers mentioning the exact date in January '03) to discuss the Armenis Papers and my financial losses in [Gallerize.com](http://www.gallerize.com). We discussed the papers, and they were duly impressed.

They kept the original papers in a police safe, where they still are today. I have color scans and photocopies.



They kept trying to urge me to make the cross-connection to 9/11 01. This is an effort that has strongly motivated me ever since 9/11 01 In brief, there are direct and highly specific (Greenwich/Stamford CT US terror cell involving the Silverstein family, AIG and others) leads in this effort of cross-connecting the Armenis Papers with 9-11. You see a lot of this in my e-book "T MINUS 9-11" the prt that is free on the plaguepuppy 9-11 video archive (10 MB of the total 38 MB), see at [www.plaguepuppy.net/public\\_html/video%20archive/](http://www.plaguepuppy.net/public_html/video%20archive/) (top item, free download of part of my book that is here relevant).

During these discussions in a conference room in the huge new police presidium (where the PX complex used to be before the US troops left Frankfurt in 93 or 94), they fed me the information that you reference. They told me they had personal contacts in the FBI. They said they "shuddered" at the methods that the US police uses. They had just concluded a meeting with their FBI contacts. The FBI contacts - as I was told - informed the German National Security Police officers that the flying object that hit the Pentagon in the morning of 9-11-1 was a U.S. cruise missile, not an airliner.

I was stunned. I asked them several times, exclaiming things like "What??" etc. They confirmed and repeated the same information several times. They were totally sober, not jokers. They are a middle thing between police officers and intelligence officers. They can be called as witnesses to testify providing that the German state government gives them a permit to testify. Without such an - unlikely - permit, this information of these German government officials remains blocked, which does not hinder unofficial disclosure. I believe my publication efforts, and my knowledge and personal involvement through Gallerize and the Armenis situation were helpful in having them open up and make these statements during our meeting. I have been in touch with one of them since, several times, with tidbits about 9-11.

I had prepared our meeting by thick briefs etc. All that is in my files.

I hope this helps to clarify your query. You may publish this information if you mention my name (Dr. Stefan Grossmann, Frankfurt) and my web site ([www.gallerize.com](http://www.gallerize.com)). If you need more information, please get back to me for further discussions. If the whole story is put together in a nutshell and disseminated I think the entire US inside terror connection will come unravelled. I have quite a bit, including organization articles etc. by now. Please study the very convoluted section in "T MINUS 9-11" about the "whodidit" question and you will get the flavor.

Thanks for writing!

In the Light,  
Stefan Grossmann

"Brad" <peace4u @ml1.net> schrieb:

> Hi Mr. Grossman,  
> I am writing in response to the article below...  
>  
> <http://www.themedianews.com/DAGGER/Stefan/018%20DOSSIER%20UA175.htm>  
>  
> QUESTION 4: Why did FBI contacts tell their friends in the  
> German National Security Police that the object that hit the  
> Pentagon on 9-11-1 was no passenger plane but a U.S. military  
> cruise missile?  
>  
> this seems to be a very important point in that it would add to the

> evidence that a 757 did not hit the pentagon as reported. I am copying  
> Dick Easman, as he supports a missile theory.  
>  
> Most important is the evidence to back this up. Do you have an article  
> on the net to point to as to where you recieved this information ?  
>  
> I would like to add i think the page is well done...  
>  
> respectfully,  
> Brad M.

---

Thank you Mr. Grossman !  
[more reading here](#)

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The Pentagon is toying with the idea of black propaganda.  
[Truth about Russia - cointelpro September 11 and the pentagon](#)

[www.gallerize.com](http://www.gallerize.com)  
[www.cloakandddagger.ca/](http://www.cloakandddagger.ca/)

[Building 7 WTC - Larry Silverstein and September 11](#)

[Larry Silverstein WTC 7 and the 9/11 Demolition](#)

[COMAIR CRASH: THE AIG - 9/11 CONNECTION](#)

[Maurice Greenberg - 9/11 Encyclopedia - AIG](#)

[Kroll Associates Inc - 9/11 Encyclopedia + AIG](#)

[Comair Crash Links: ACS, ManTech, A PRIOR PLANE CRASH, Bribery - AIG](#)

[Open letter to the 911 Commission RE: The controlled demolitions of buildings WTC 6 7 on 9-11-2001](#)

[Nerdcities/Guardian - articles and videos - 911review](#)

[Scholars for Truth about 9/11](#)

[WTC Plane Engine - 9-11 Review](#)

[guardian video archives 9/11 review](#)

[guardian WTC7 9/11 review](#)

[World trade center building seven demolition video - September 11 attacks](#)

[Jeff King - WTC collapse video controlled demolition 9/11](#)

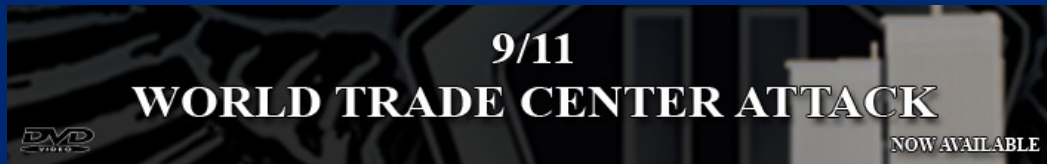
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### 9/11: Pentagon Aircraft Hijack Impossible, FLIGHT DECK DOOR CLOSED FOR ENTIRE FLIGHT

Rating ★★★★★ ▾

Options ▾

**rob balsamo** ▾

Nov 27 2009, 11:55 AM

Post #1

**Administrator**

Group: Admin  
Posts: 7,735  
Joined: 13-August 06  
Member No.: 1

#### 9/11: PENTAGON AIRCRAFT HIJACK IMPOSSIBLE FLIGHT DECK DOOR CLOSED FOR ENTIRE FLIGHT

(PilotsFor911Truth.org) - Newly decoded data provided by an independent researcher and computer programmer from Australia exposes alarming evidence that the reported hijacking aboard American Airlines Flight 77 was impossible to have existed. A data parameter labeled "FLT DECK DOOR", cross checks with previously decoded data obtained by Pilots For 9/11 Truth from the National Transportation Safety Board (NTSB) through the Freedom Of Information Act.

On the morning of September 11, 2001, American Airlines Flight 77 departed Dulles International Airport bound for Los Angeles at 8:20 am Eastern Time. According to reports and data, a hijacking took place between 08:50:54 and 08:54:11[1] in which the hijackers allegedly crashed the aircraft into the Pentagon at 09:37:45. Reported by CNN, according to Ted Olson, wife Barbara Olson had called him from the reported flight stating, "...all passengers and flight personnel, including the pilots, were herded to the back of the plane by armed hijackers..."[2]. However, according to Flight Data provided by the NTSB, the Flight Deck Door was never opened in flight. How were the hijackers able to gain access to the cockpit, remove the pilots, and navigate the aircraft to the Pentagon if the Flight Deck Door remained closed?[3]

Founded in August 2006, Pilots For 9/11 Truth is a growing organization of aviation professionals from around the globe. The organization has analyzed Data provided by the National Transportation Safety Board (NTSB) for the Pentagon Attack, the events in Shanksville, PA and the World Trade Center attack. The data does not support the government story. The NTSB/FBI refuse to comment. Pilots For 9/11 Truth do not offer theory or point blame at this point in time. However, there is a growing mountain of conflicting information and data in which government agencies and officials along with Mainstream Media refuse to acknowledge. Pilots For 9/11 Truth Core member list continues to grow.

<http://pilotsfor911truth.org/core.html> for full member list.

<http://pilotsfor911truth.org/join> to join.

[1] Hijacker Timeline - <http://pilotsfor911truth.org/forum/index.php?showtopic=17>

[2] Common Strategy Prior to 9/11/2001 - <http://pilotsfor911truth.org/pentagon.html>

[3] Right click and save target as [here](#) to download csv file with "FLT DECK DOOR" parameter.

[↑ TOP](#)[+ QUOTE](#) [" REPLY](#) **Domenick DiMaggi...**

Nov 27 2009, 12:42 PM

Post #2

(IMG:style\_emoticons/default/cheers.gif)

Group: Contributor  
Posts: 219  
Joined: 27-August 07  
Member No.: 1,875

[↑ TOP](#)[+ QUOTE](#) [" REPLY](#) **painter**

Nov 27 2009, 12:48 PM

Post #3

# WOW!


∞\* MERCURIAL \*∞

**Administrator**

Group: Administrator  
Posts: 5,835  
Joined: 25-August 06  
From: SFO  
Member No.: 16

(IMG:style\_emoticons/default/ohmy.gif) (IMG:style\_emoticons/default/ohmy.gif)  
(IMG:style\_emoticons/default/ohmy.gif)

(IMG:style\_emoticons/default/handsdown.gif) (IMG:style\_emoticons/default/handsdown.gif)  
(IMG:style\_emoticons/default/handsdown.gif)

[↑ TOP](#)[+ QUOTE](#) [" REPLY](#) **rob balsamo**

Nov 27 2009, 12:54 PM

Post #4

For easier reference, i have uploaded a csv file of the FLIGHT DECK DOOR and GMT (Time) parameters side by side.

**Administrator**

Group: Admin  
Posts: 7,735  
Joined: 13-August 06  
Member No.: 1

<http://www.megaupload.com/?d=XX44XLUH>

[↑ TOP](#)[+ QUOTE](#) [" REPLY](#) **DoYouEverWonder**

Nov 27 2009, 01:16 PM

Post #5

Official Story - Busted

(IMG:style\_emoticons/default/cheers.gif)

Group: Private Forum Pilot  
Posts: 298  
Joined: 1-February 09  
From: FL  
Member No.: 4,096

[↑ TOP](#)[+ QUOTE](#) [" REPLY](#) **painter**

Nov 27 2009, 01:28 PM

Post #6

QUOTE (rob balsamo @ Nov 27 2009, 09:54 AM)



For easier reference, i have uploaded a csv file of the FLIGHT DECK DOOR and GMT (Time) parameters side by side.

∞\* MERCURIAL \*∞

**Administrator**

Group: Administrator



Posts: 5,835  
Joined: 25-August 06  
From: SFO  
Member No.: 16

<http://www.megaupload.com/?d=XX44XLUH>

Rob, I think this information is going to spread fast. Would you give those of us who are not airline professionals (and those who may be visiting this forum for the first time ever) a laymans understanding of what this .csv file actually represents?

I understand this is data from the Flight Data Recorder (FDR) allegedly found inside the Pentagon shortly after 9/11; allegedly from AA Flight 77 which was reported to have struck the Pentagon.

Having been on this forum for years I understand that this data was received by Pilots for Truth (and other organizations) from the NTSB (National Transportation and Safety Board, the federal agency tasked by Congress to investigate every civil aviation accident in the US) via a Freedom of Information Act Request (FOIA) submitted in 2006. I also understand that the NTSB regard this FDR data as a "work product" generated FOR the FBI's 9/11 investigation "Pentbomb" team. In other words, the NTSB was not investigating an "accident" but the FBI was investigating a crime scene and requested the NTSB decode the FDR for their investigative purposes.

Moreover (and correct me if I'm wrong), the "Black Box" FDR was allegedly found within the Pentagon (two different stories of its discovery were reported at the time) and turned over to the FBI prior to having been given to the NTSB (establishing chain of custody).

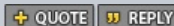
Finally, I also know that Pilots for 9/11 Truth has found MANY inconsistencies within this FDR derived data that strongly suggest (in brief) that the aircraft from which it came could NOT have impacted the Pentagon -- and, thus, that the FDR is a planted, fake piece of evidence. These numerous inconsistencies have been the subject of many of the Pilots for Truth presentations generated over the past three years.

If any of the above is inaccurate, please correct me.

SO.. my request is that you tell those of us who are not professionals in this field precisely what this .csv file represents. If I have it correct, it is ONE parameter (of many thousands) that was ostensibly recorded IN FLIGHT; that it shows that throughout the timeline of the flight the cockpit door was NOT opened.

Do you have any further comment or clarification to add to this? It would be appreciated by many, I'm sure.

EDIT to add: From the .csv file, it appears this information regarding the status of the cockpit door was updated EVERY FOUR SECONDS throughout the entire flight and not once during that time does the data indicate that the door was open.



Domenick DiMaggi...

Nov 27 2009, 01:31 PM

Post #7

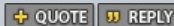
QUOTE (painter @ Nov 25 2009, 04:28 PM)

Rob, I think this information is going to spread fast.

Group: Contributor  
Posts: 219  
Joined: 27-August 07  
Member No.: 1,875

i know i'm doing my best!

(IMG:style\_emoticons/default/thumbsup.gif)



rob balsamo

Nov 27 2009, 01:56 PM

Post #8

QUOTE (painter @ Nov 27 2009, 01:28 PM)

SO.. my request is that you tell those of us who are not professionals in this field precisely what this .csv file represents. If I have it correct, it is ONE parameter (of many thousands) that was ostensibly recorded IN FLIGHT; that it shows that throughout the

Administrator

Group: Admin

Posts: 7,735  
Joined: 13-August 06  
Member No.: 1

timeline of the flight the cockpit door was NOT opened.

You can download the data from our pinned topics section in the AA77 forum, the above OP or if you dont want to wade through all the parameters, i have copy/pasted **only** the FLT DECK DOOR parameter, side by side with the Clock into a new csv file and uploaded at the megaupload link above.

For those who do not want to scroll through 1.5 hours of flight, just click Edit/Find on your spreadsheet and type in OPEN, click find. Its not there. The door was closed for the entire flight according to the data.

Also, i cross checked this with Capt Ralph Kolstad who flew the 757 with American just to make sure their 757's have a sensor for when the door is open. They have an overhead button to push to open the flight deck door. The button lights up when the door is open. There is a sensor on the door.

Hope this helps...

↑ TOP

+ QUOTE    ⌘ REPLY

rob balsamo

Nov 27 2009, 02:33 PM

Post #9

Administrator

Group: Admin  
Posts: 7,735  
Joined: 13-August 06  
Member No.: 1

QUOTE (painter @ Nov 27 2009, 01:28 PM) ⌘

EDIT to add: From the .csv file, it appears this information regarding the status of the cockpit door was updated EVERY FOUR SECONDS throughout the entire flight and not once during that time does the data indicate that the door was open.

Just saw this edit. Sorry i missed it painter...

yes, thats correct. Once every 4 seconds, which no doubt will be the excuse used by those who find any excuse to hold onto their support of what the govt has told them...

I suppose its certainly possible to get one person through the door in 4 seconds and close it fast therefore not being recorded. But was Hani the only one through? And did he take down Chic and the FO all by his little ol' self? Also remember, the pilots were "herded" to the back of the plane according to Barbara through Ted Olson and CNN. Were the pilots shoved through the door one by one with tiny Hani closing the door after each pass in hopes the FDR wouldnt record the door open?

Another theory that some may use is that Hani was on the jumpseat and therefore the door never needed to be open. After 9/11, the cockpit jumpseat was closed to all offline commuters (pilots from other airlines who couldnt be verified) due to the fact govt officials thought the hijackers had access to the flight deck. Is the above parameter the reason why they thought this? Because the door was never opened? If this were the case, you still have 2 pilots against one, and the problem of 'herding the pilots to the back of the plane'. The door had to be open either way, and for more than 4 seconds... if the govt story is to hold true.

Im sure the theories will be-a-plenty and far reaching from those who make excuse for the govt story... as usual... (IMG:style\_emoicons/default/rolleyes.gif)

↑ TOP

+ QUOTE    ⌘ REPLY

painter

Nov 27 2009, 02:42 PM

Post #10

∞\* MERCURIAL \*∞

Administrator

Group: Administrator  
Posts: 5,835  
Joined: 25-August 06  
From: SFO  
Member No.: 16

Thanks, Rob.


One of the difficulties I think many people have with understanding the SIGNIFICANCE of the FDR information is that it is what I call a "conundrum." On one hand, we've been given data from an agency of the Federal government (NTSB) but, on the other hand, the data itself suggests that the aircraft from which it came could NOT have struck the pentagon on 9/11. If the aircraft could not have struck the Pentagon then it follows logically that the FDR could not have been discovered within the Pentagon unless it was planted there by parties



unknown. This, however, begs the question, if someone was going to go to all the trouble to in some way FAKE the FDR data and plant it as evidence, why does that data NOT clearly indicate a feasible impact scenario?

I understand that question can not be answered with certainty, it necessitates a degree of speculation which Pilots for 9/11 Truth is reluctant to make. All that can be said with certainty is that the FDR data indicates the plane from which it came did NOT strike the Pentagon. This is especially evident in the last Radar Altitude which places the plane too high to impact the light poles and too high to descend in tact and strike the Pentagon precisely at foundation level. (Incidentally, no foundation damage from the engines was recorded or reported by government officials.) NOW we understand that according to this data the plane could NOT have even been hijacked. This is astounding and perplexing information with highly disturbing implications.

Would you care to comment on this? For example, is it possible for this data to have been generated by some other means than that of a flying aircraft -- a flight simulator for example?

[↑ TOP](#)[+ QUOTE](#) [" REPLY](#) **rob balsamo**

Nov 27 2009, 03:03 PM

Post #11

**Administrator**

Group: Admin  
Posts: 7,735  
Joined: 13-August 06  
Member No.: 1

**QUOTE (painter @ Nov 27 2009, 02:42 PM)** 

Would you care to comment on this? For example, is it possible for this data to have been generated by some other means than that of a flying aircraft -- a flight simulator for example?

You know me painter, i dont speculate.. (IMG:style\_emoticons/default/wink.gif)


But i'll rephrase the question.

Is it possible to simulate FDR data from a cockpit simulator? I dont see why not... its all bits and bytes.. (IMG:style\_emoticons/default/smile.gif)

What makes this FLT DECK DOOR parameter extremely damaging is that this is only a 1 or 0. Either its open, or it is not. Simple open and shut case, (no pun intended). As compared to say altitude which has a string of binary in which software then interprets into an actual altitude.

Keep in mind, Pilots For 9/11 Truth do not confirm or deny any validity of the FDR data provided by govt agencies. What makes this data so alarming is that govt agencies claim its data from AA77, yet doesnt support their story. Its clear why they refuse to comment.

We actually had this parameter when we decoded the raw file ourselves more than 2 years ago. But, it showed all zero's so i just skipped it. Once Warren provided it in terms of the Data Frame Layout (0=CLOSED, 1=OPEN), is when i decided to scroll through and see when it was open and if it corresponded with the roughly 3 min hijack timeline (which in itself is an absurdly short time frame to take over an aircraft). As you can see, the data shows the door closed through the entire flight.

[↑ TOP](#)[+ QUOTE](#) [" REPLY](#) **jensdarup**

Nov 27 2009, 03:24 PM

Post #12

<http://twitter.com/colmanjones/status/6117740726>


Group: Student Forum Pilot  
Posts: 69  
Joined: 10-September 09  
Member No.: 4,610

[↑ TOP](#)[+ QUOTE](#) [" REPLY](#)

painter Nov 27 2009, 03:47 PM Post #13

∞\* MERCURIAL \*∞  
Administrator

Group: Administrator  
Posts: 5,835  
Joined: 25-August 06  
From: SFO  
Member No.: 16

QUOTE (rob balsamo @ Nov 27 2009, 12:03 PM) 

You know me painter, i dont speculate.. (IMG:style\_emoticons/default/wink.gif)

But i'll rephrase the question.

Is it possible to simulate FDR data from a cockpit simulator? I dont see why not... its all bits and bytes.. (IMG:style\_emoticons/default/smile.gif)

What makes this FLT DECK DOOR parameter extremely damaging is that this is only a 1 or 0. Either its open, or it is not. Simple open and shut case, (no pun intended). As compared to say altitude which has a string of binary in which software then interprets into an actual altitude.

Keep in mind, Pilots For 9/11 Truth do not confirm or deny any validity of the FDR data provided by govt agencies. What makes this data so alarming is that govt agencies claim its data from AA77, yet doesnt support their story. Its clear why they refuse to comment.

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Thanks, Rob. This is exactly what I was looking for!

TOP QUOTE REPLY

tnemelckram Nov 27 2009, 05:11 PM Post #14

Group: Contributor  
Posts: 588  
Joined: 30-January 08  
Member No.: 2,690

AWWWright let me be the first to debunk this.

Have any of you heard of human osmosis? I've seem people walk through solid objects many times in the movies. Them 911 hijackers were ten feet tall and surely capable of this.

Just kidding . . .

Nice work Rob!

TOP QUOTE REPLY

tnemelckram Nov 27 2009, 05:11 PM Post #15

Group: Contributor  
Posts: 588  
Joined: 30-January 08  
Member No.: 2,690

AWWWright let me be the first to debunk this.

Have any of you heard of human osmosis? I've seem people walk through solid objects many times in the movies. Them 911 hijackers were ten feet tall and surely capable of this.


Just kidding . . .

Nice work Rob!

TOP QUOTE REPLY

painter Nov 27 2009, 05:20 PM Post #16

∞\* MERCURIAL \*∞  
Administrator

QUOTE (Domenick DiMaggio CIT @ Nov 27 2009, 10:31 AM) 

i know i'm doing my best!

TOP QUOTE REPLY



Group: Administrator  
Posts: 5,835  
Joined: 25-August 06  
From: SFO  
Member No.: 16

(IMG:style\_emoticons/default/thumbsup.gif)

I notice 911blogger hasn't said word 1 about it

↑ TOP

+ QUOTE    " REPLY

rob balsamo

Nov 27 2009, 05:40 PM

Post #17

Administrator

Group: Admin  
Posts: 7,735  
Joined: 13-August 06  
Member No.: 1

Wow, this article is going viral. Over 1000 people logged onto this thread alone at this time. We're setting records today.

I took a stroll around the net to see the excuses made by a select few who blindly follow anything the govt tells them. I'll address them here for now.

Claim - How can anyone trust data from some anonymous guy in Australia?

A. We agree, but he is not really anonymous. He does give his name, but we weren't able to ask him if he wanted his name used in the article. That is why we cross checked it with our own data we received from the NTSB. You can also get your own directly from the NTSB as we did. Visit [ntsb.gov](http://ntsb.gov) and fill out their FOIA request form online.

Claim - Does the cockpit door show open for the pilots to get in?

A. No, it shows closed for entire flight. The FDR starts recording when the engines are started. Clearly the pilots would be in their seats and cabin/flight deck secure during this phase of flight.

Claim - Does the FDR record if the door is open or closed?

A. Clearly it does. It says closed for the entire flight and was confirmed by the Data Frame Layout provided by the NTSB and a pilot who has flight time in this exact 757 at American Airlines.

Claim - The sensor must have failed.

A. Speculation, but if the sensor failed, it would "ding" the FDR that a sensor has failed during self-diagnosis. If the FDR is inoperative, the airplane is not allowed to take-off. The sensor was operative. People who make this claim, would also have to prove the sensor fails in the closed position.

Claim - The hijackers kicked in the door and jammed the sensor in the closed position.

A. Again, pure speculation based on incredulity. But the fact remains, the data shows the door as closed, the altitude too high to hit the Pentagon, Vertical speed too great for level off as seen in DoD 5 frames video, the list goes on. The NTSB/FBI refuse to comment on such blatant conflict with the govt story.

Claim - The bird strike which took out the Flight Data Recorder prior to impact also took out the door sensor 30 mins prior to impact

A. Not really a claim made by "duhbunkers" at this point in time, but give it a few days.

(IMG:style\_emoticons/default/wink.gif)

↑ TOP

+ QUOTE    " REPLY

911analyzer

Nov 27 2009, 06:35 PM

Post #18

Excellent work!

So I guess my next question would be is if this data parameter is present on any other FDR data of the day, also showing a "no cockpit door opened status." That would be double trouble.

Group: Student Forum Pilot  
Posts: 7  
Joined: 3-March 08  
Member No.: 2,828

[↑ TOP](#)[+ QUOTE](#)[" REPLY](#)

**Craig Ranke CIT**

Nov 27 2009, 06:46 PM

Post #19

It will be interesting to see whether or nor Stutt squirms about this after working so hard to use this decode to push his bogus 4 foot claims.

Group: Contributor  
Posts: 923  
Joined: 15-October 06  
Member No.: 75

[↑ TOP](#)[+ QUOTE](#)[" REPLY](#)

**painter**

Nov 27 2009, 06:49 PM

Post #20

**QUOTE (painter @ Nov 27 2009, 02:20 PM)** 

I notice 911blogger hasn't said word 1 about it

STIKE THAT -- I see blogulator has put it up on 911blogger:

∞\* MERCURIAL \*∞  
**Administrator**

Group: Administrator  
Posts: 5,835  
Joined: 25-August 06  
From: SFO  
Member No.: 16

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presumably done to disguise the fact that although, in the original database, there were records for the diversion of UA 93 and UA 175, there were none for the diversion of AA 11 and AA 77. The reason why there were no records for the diversion of AA 11 and AA 77 is that these flights did not exist.

#### QUOTE



Go to this page on the BTS website:

<http://www.bts.gov/xml/ontimesummarystatis...mmaryFlightData>

and select "United Airlines", flight number "0093" and the date range September 10th to 11th, 2001. A page appears which gives data for UA 93 on September 10th, but above this is a note:

On September 11, 2001, American Airlines Flight #11 and #77 and United Airlines #93 and #175 were hijacked by terrorists. Therefore, these flights are not included in the on-time summary statistics.

But this note was added sometime after November 2003. Before that the same query (but for September 11, 2001, only) produced the page shown here.

In the original BTS database similar queries returned the following pages for UA 93, AA 11 and AA 77. Thus the summary on-time statistics (over any specified time period) for the four flight numbers differ in the current version of the BTS database from the version which existed until sometime in 2004 in this respect: In the original version that summary included data for UA 93 and UA 175 on September 11, 2001, whereas data on AA 11 and AA 77 is explicitly stated to be non-existent. But in the current version, data for all four flights on September 11, 2001, is excluded. This change was made presumably to disguise the fact that Flights AA 11 and AA 77 did not exist on September 11, 2001.



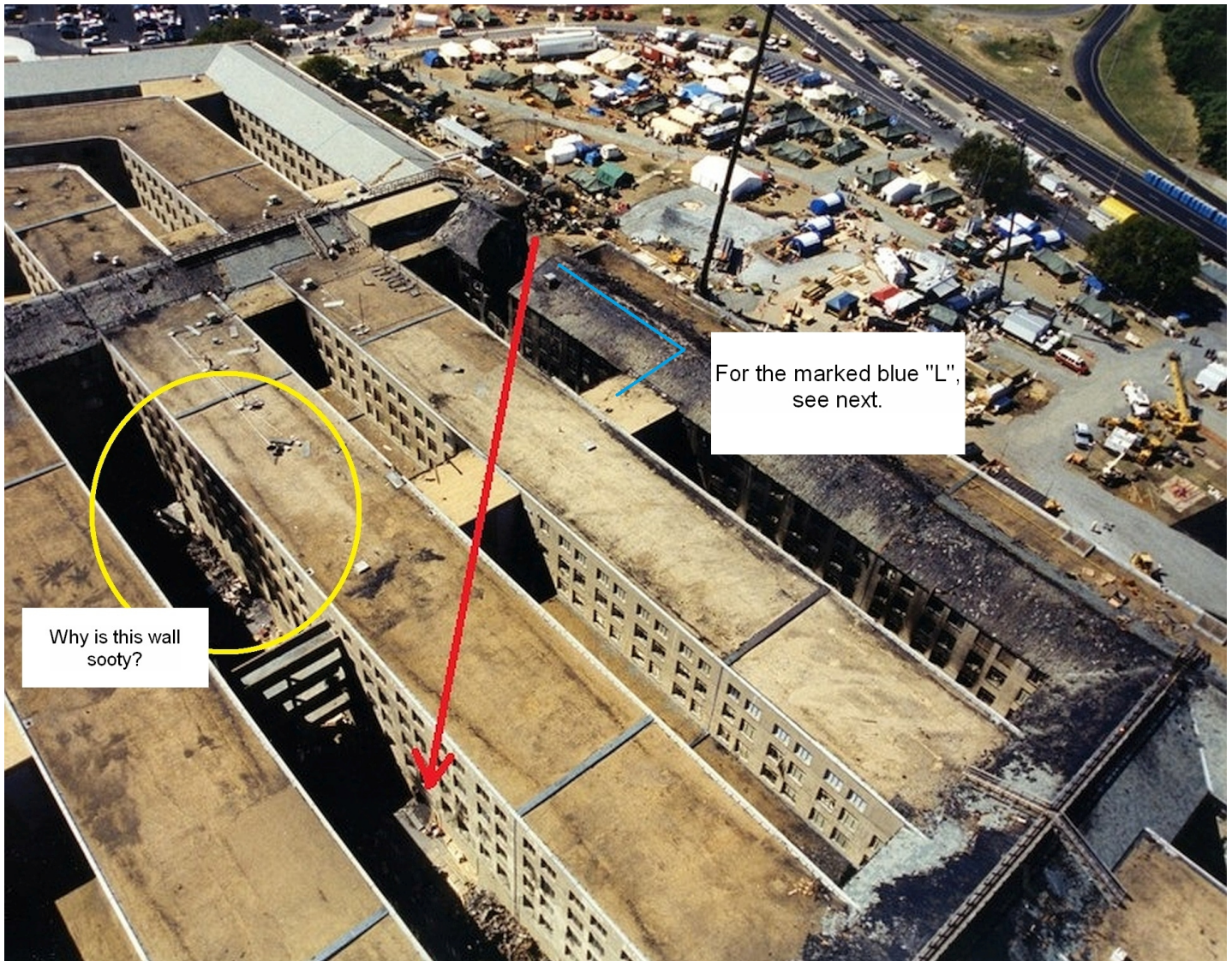
But, more importantly, this information is not what was originally given on the BTS website. Up until sometime in 2004 queries to the BTS database returned different information. The results of these queries were reported by Gerard Holmgren in November 2003 and later updated [here](#). *[This page has now, January 2012, disappeared.]*

Others who read his report saved the relevant BTS pages directly from the BTS website. They were previously discussed in an article on this website by the present author ([Reply to Popular Mechanics re 9/11](#)) and since April 2005 they have been available for downloading via:

[http://www.serendipity.li/wot/pop\\_mech/bts.zip](http://www.serendipity.li/wot/pop_mech/bts.zip)



In my 9-11 materials data DVD ROM, I have written my notes on a number of photos. I would like to include them here to enable a reading experience for my notes in a sequence. I would like to repeat that there is quite a bit more material on the DVD; a written Report such as this text is not a good medium for replicating the full contents of such a DVD (over 5 GB) sufficiently.





This is the marked blue "L". What explosion destroyed the short cross-corridor?





This is the sooty wall in the yellow oval. What were these  
explosions?  
It looks like a Hollywood "B" movie.



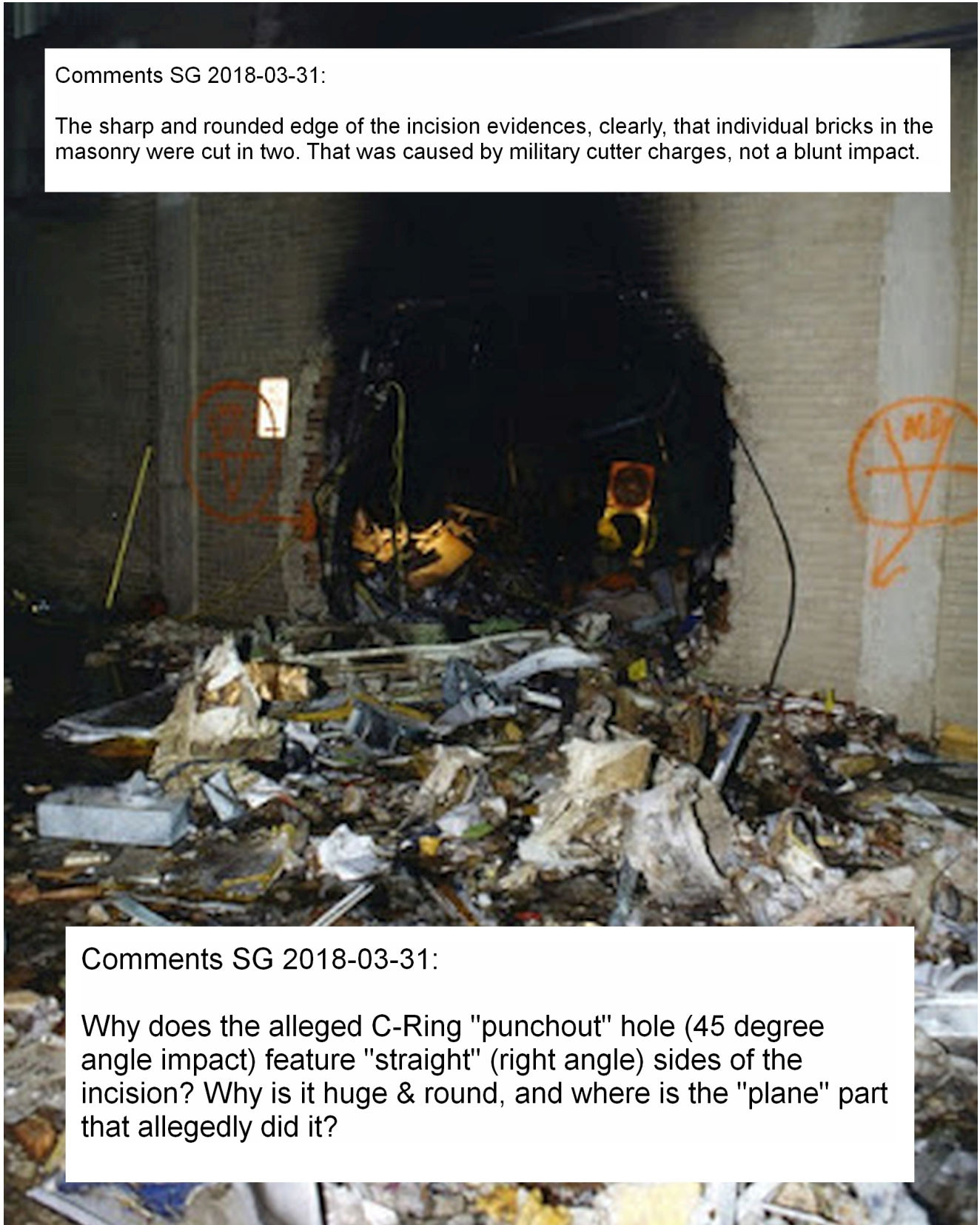


Where is the light at the other end of the "punch through" tunnel? ...



Comments SG 2018-03-31:

The sharp and rounded edge of the incision evidences, clearly, that individual bricks in the masonry were cut in two. That was caused by military cutter charges, not a blunt impact.



Comments SG 2018-03-31:

Why does the alleged C-Ring "punchout" hole (45 degree angle impact) feature "straight" (right angle) sides of the incision? Why is it huge & round, and where is the "plane" part that allegedly did it?

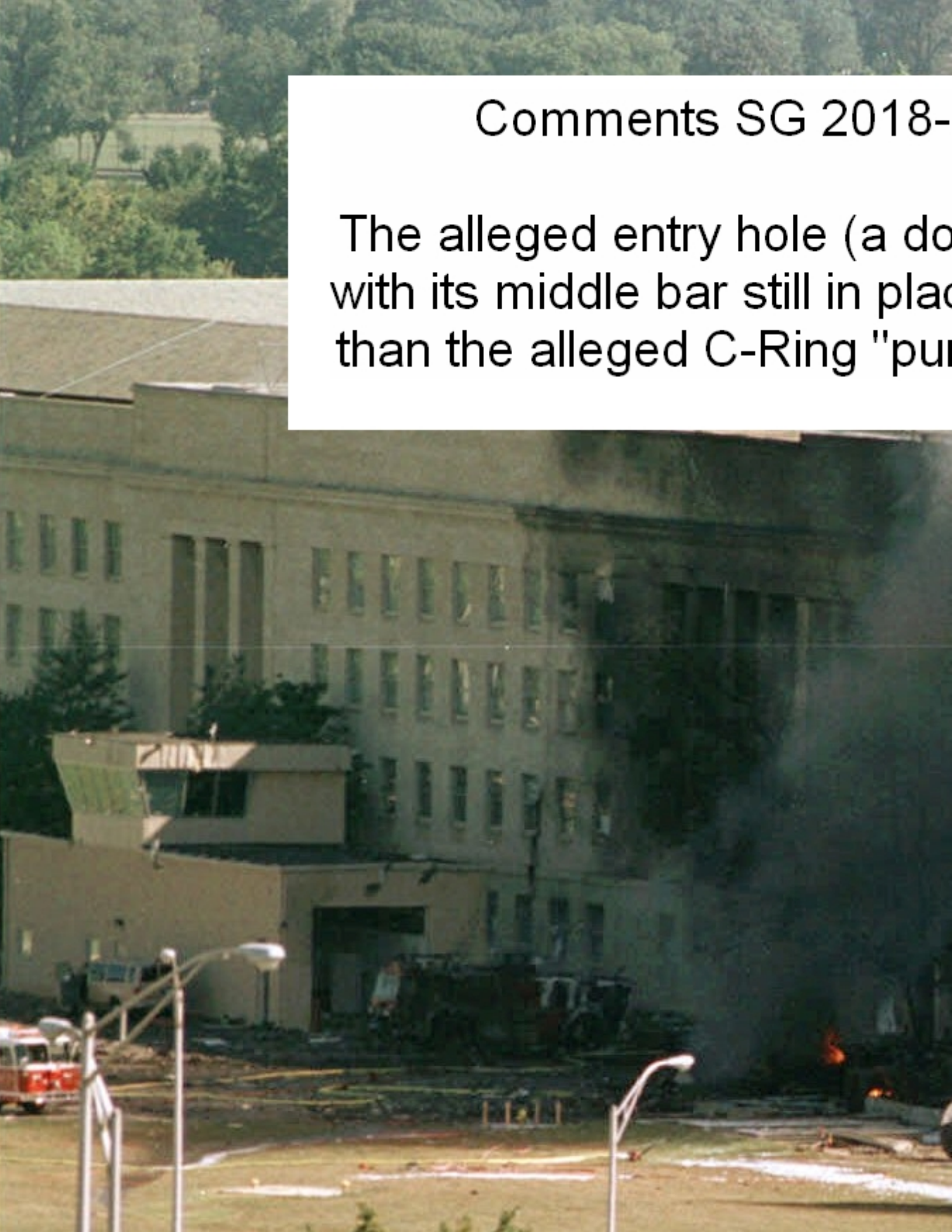




Detail from photo showing cut bricks, evidencing the use of military cutter charges to fake 9-11.

Comments SG 2018-

The alleged entry hole (a door) with its middle bar still in place, is smaller than the alleged C-Ring "punch hole".



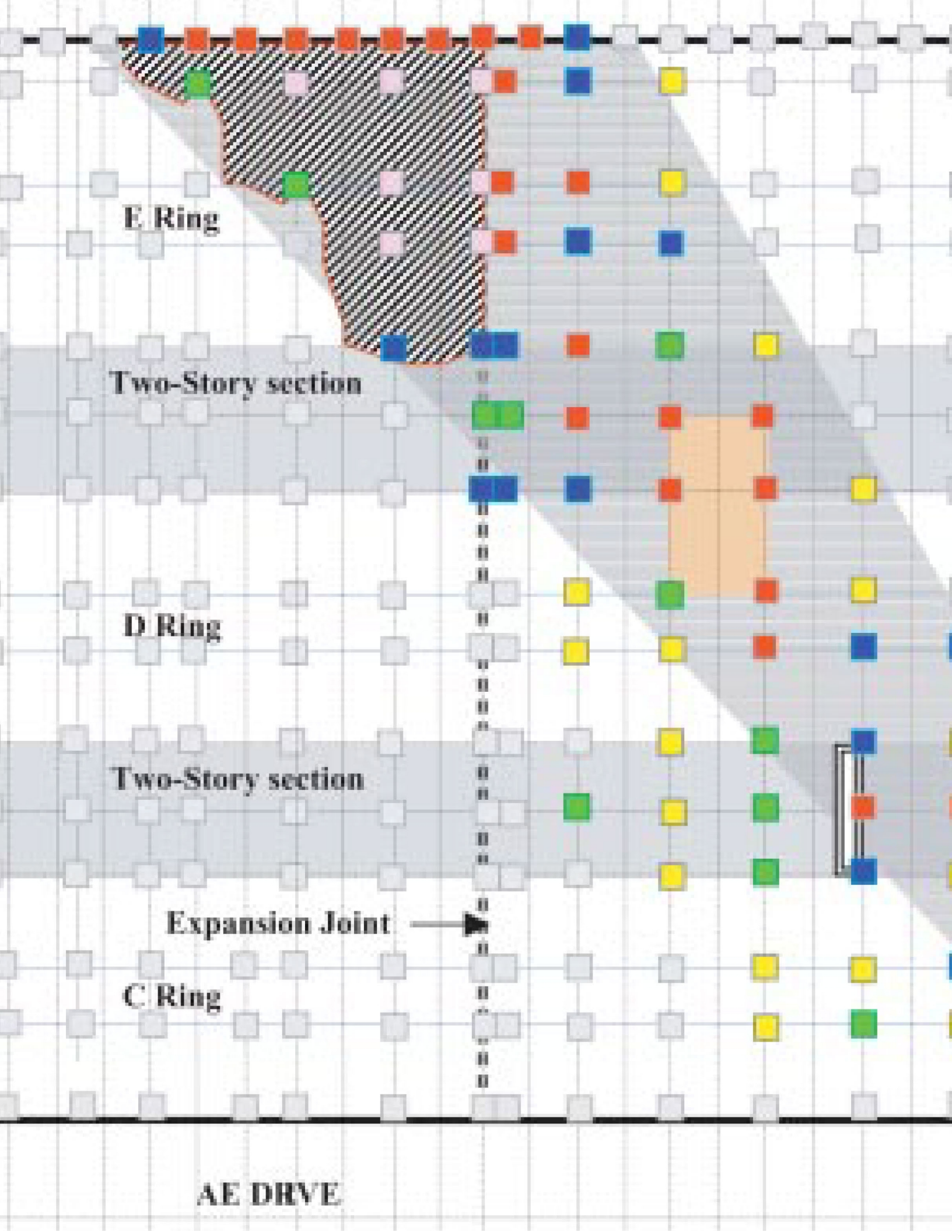


03-31:

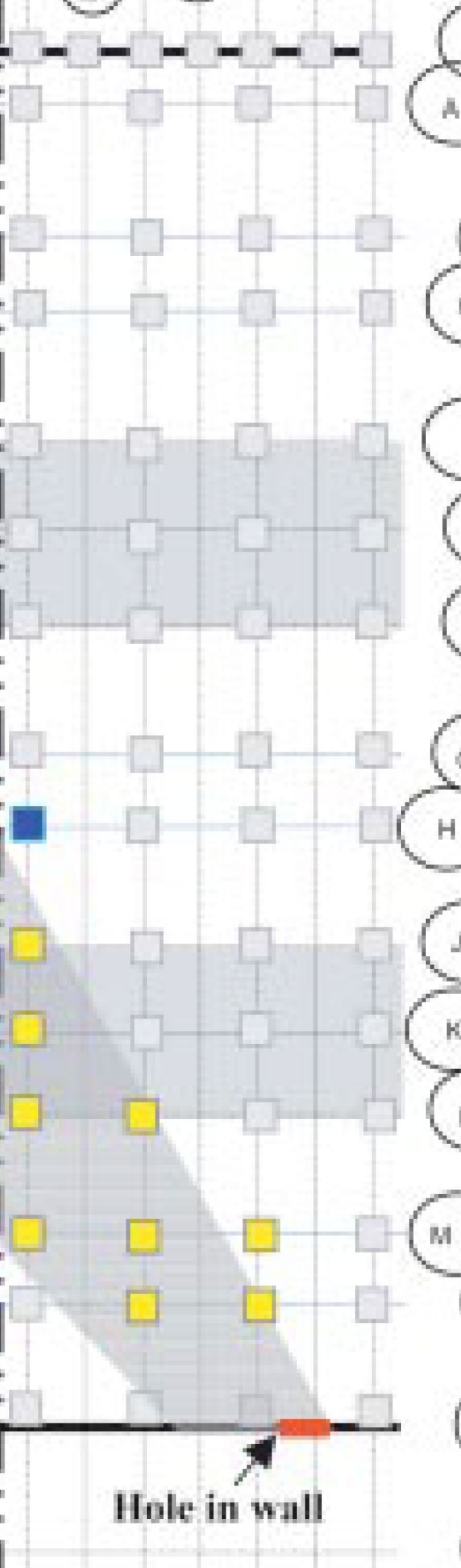
Double window  
(ce) is smaller  
"inchout" hole.









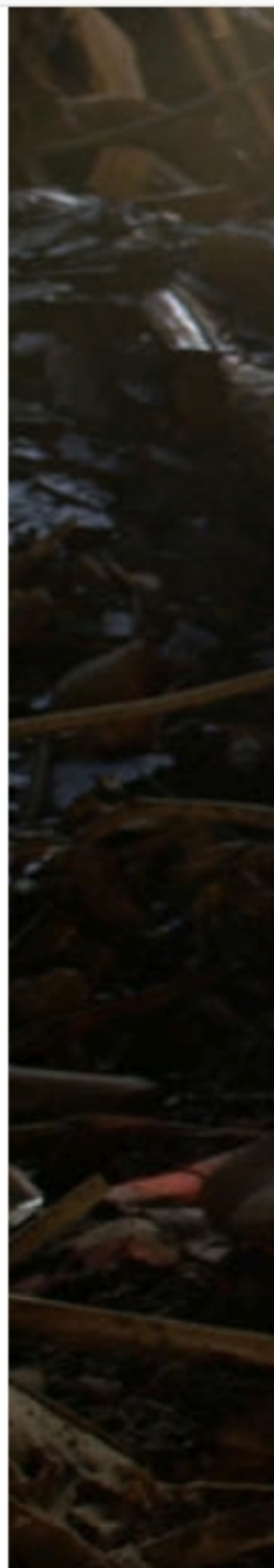


Comment SG 2018-03-31:

1. The graphic at the left was taken from p. 53 of Paul F. Mlakar et al.; "The Pentagon Building Performance Report" ((ASCE 2003). That is the official government-commissioned Report.
2. Notice that columns (with the exception of pink and red) were damaged in degrees but were standing.
3. Using simple graphic software (such as, MS Paint), and if you draw auxiliary lines in the graphic starting at the collapse area (top left of graphic) to the "punchout hole" (C-Ring), it can be verified that a straight path for the hypothetical object that "punched" the "punchout hole" was entirely blocked by columns that remained standing.
4. In summary, the narrative of a penetration from "E-Ring" through "D-Ring" and out behind "C-Ring" is a hoax and a swindle according to the former government's own official documentation.



still looking, nothing ... Gus  
(dog) hasn't found the  
plane, either, no passenger  
dead or alive, no luggage.







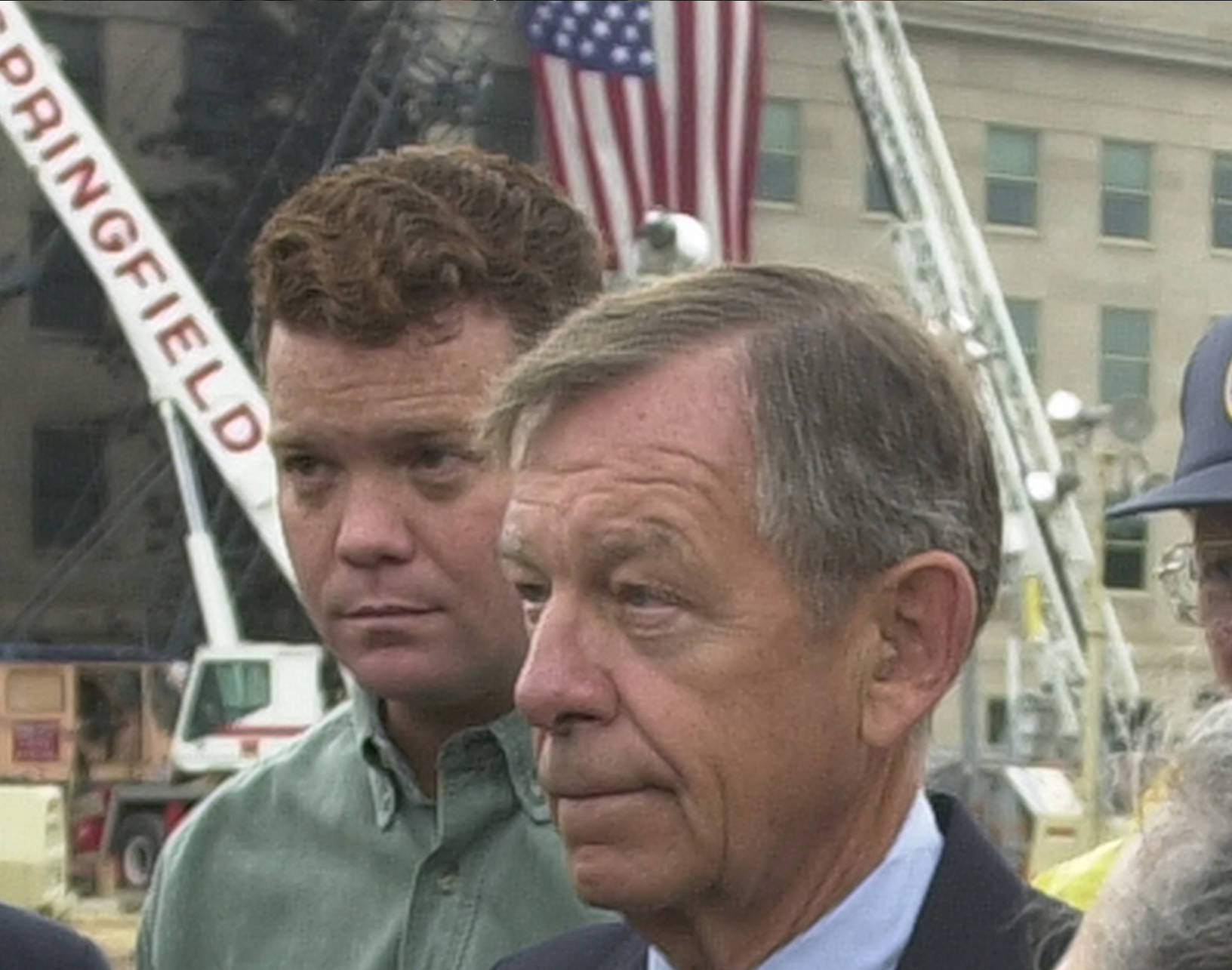
Arlington, Va., September 14, 2001 -- Gus, a rescue dog from Tennessee Task Force One Urban Search and Rescue team searches the crash site at the Pentagon. Photo by Jocelyn Augustino/ FEMA News Photo  
Jocelyn Augustino - Sep 13, 2001 - Location: Arlington, VA

[Download](#)[Photo Details](#)[Image Usage Guidelines](#)[Virginia Terrorist Attack \(DR-1392\)](#)





stomach problems ...







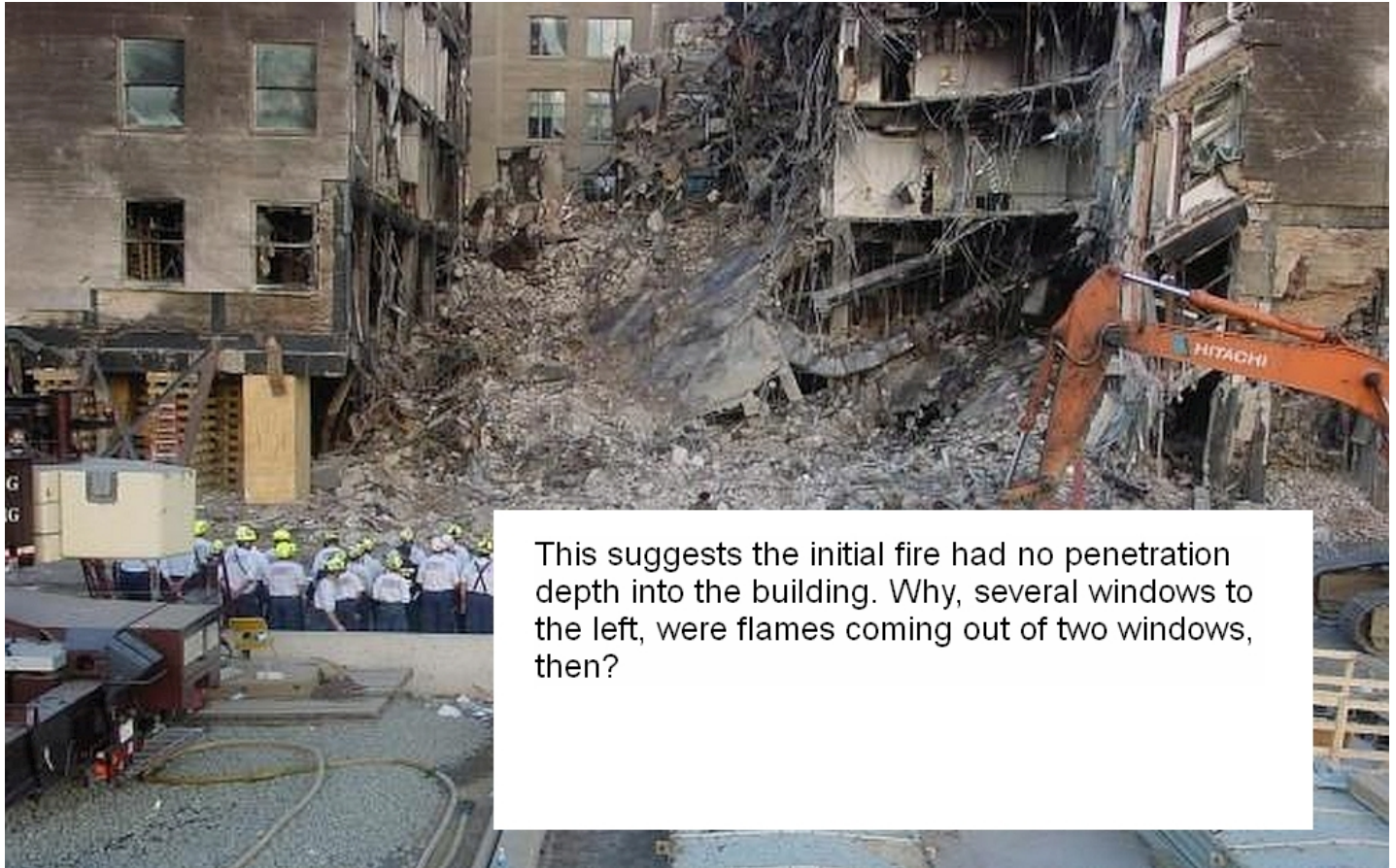
Comment SG 2018-04-12

Why is the middle hole burning if the kerosene from an "airplane" was in two wing tanks?



Why is the fire burning up to the second floor if no ceiling was broken?





This suggests the initial fire had no penetration depth into the building. Why, several windows to the left, were flames coming out of two windows, then?



Comments SG 2018-03-31:

The columns were pushed sideways but not inwards (shaped charge, Eric Bart.)  
Large spools in the approach path remained standing.



# StevenWarRan

Non-Violence and the Second Amendment

Sunday, November 11, 2007

## Pentagon Columns Were Blasted with Pre-Planted Explosives

The following official FEMA photographs make plain the fact that shaped-charge explosives were used to assist in bringing down the tiny flap of Pentagon September 11th, 2001.

FEMA 4924





SG note 2018-04-25

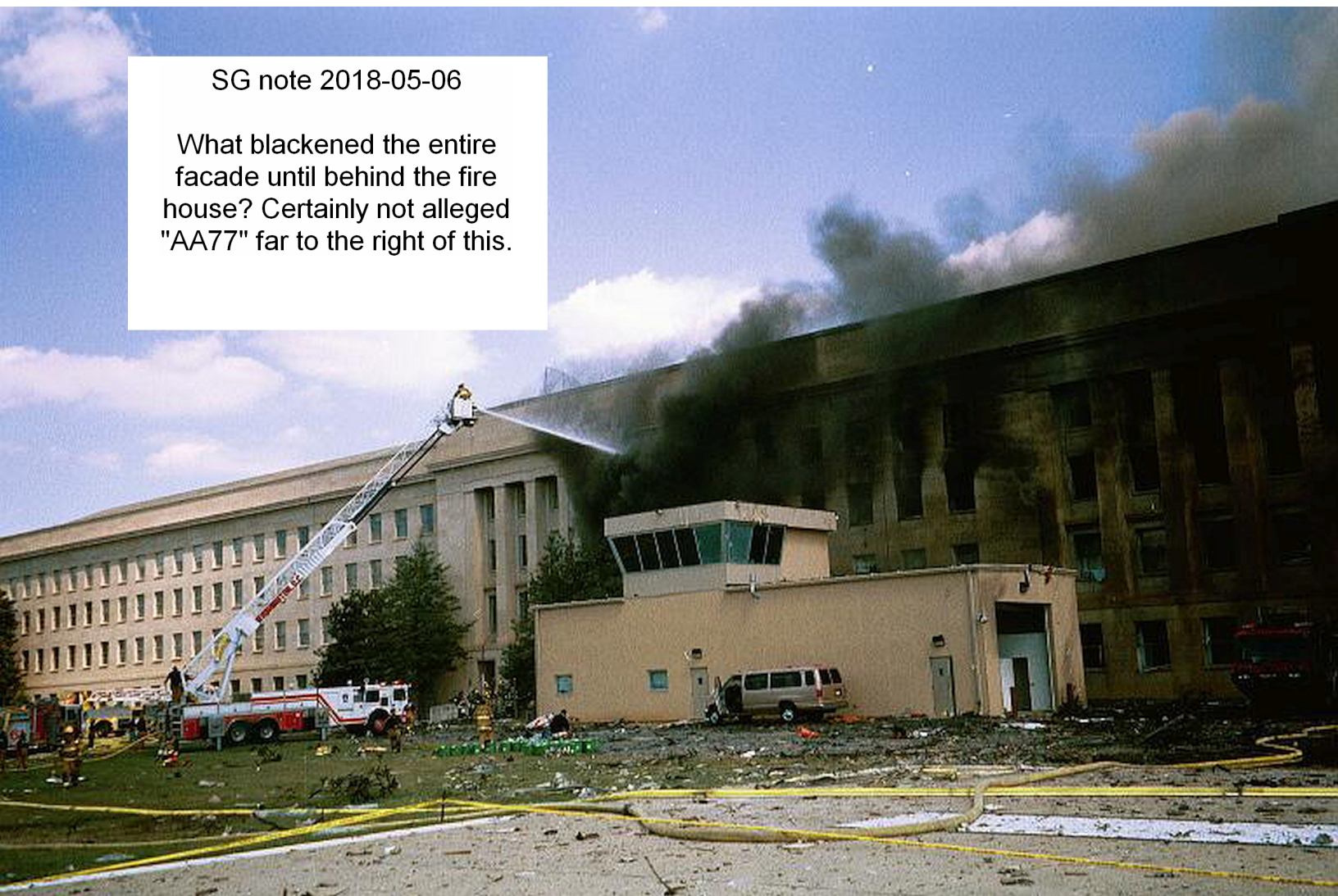
Below: Two blast-resistant windows (greenish) survived the "plane" crash but, in the collapse, were blown outward.





SG note 2018-05-06

What blackened the entire facade until behind the fire house? Certainly not alleged "AA77" far to the right of this.







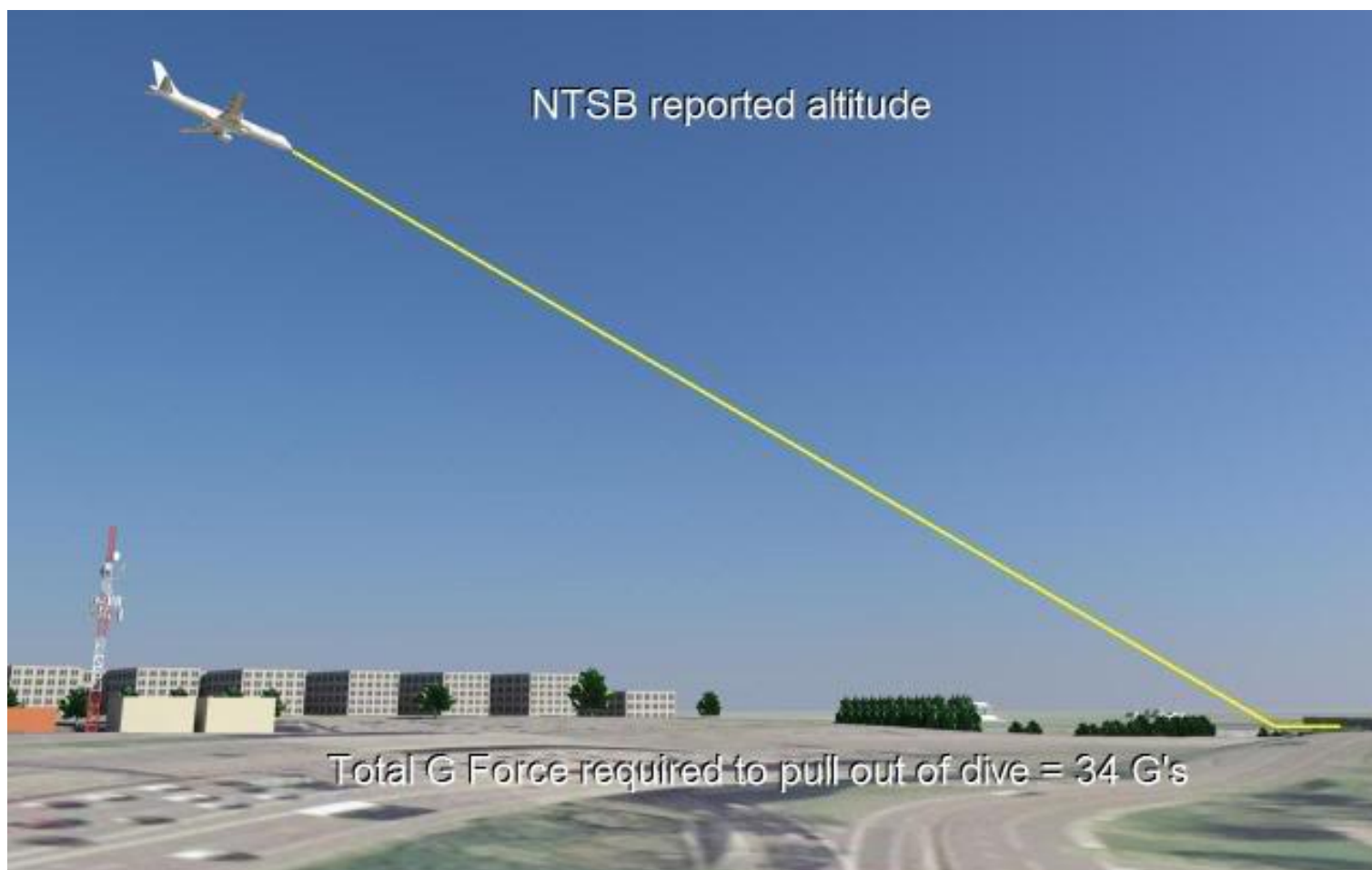
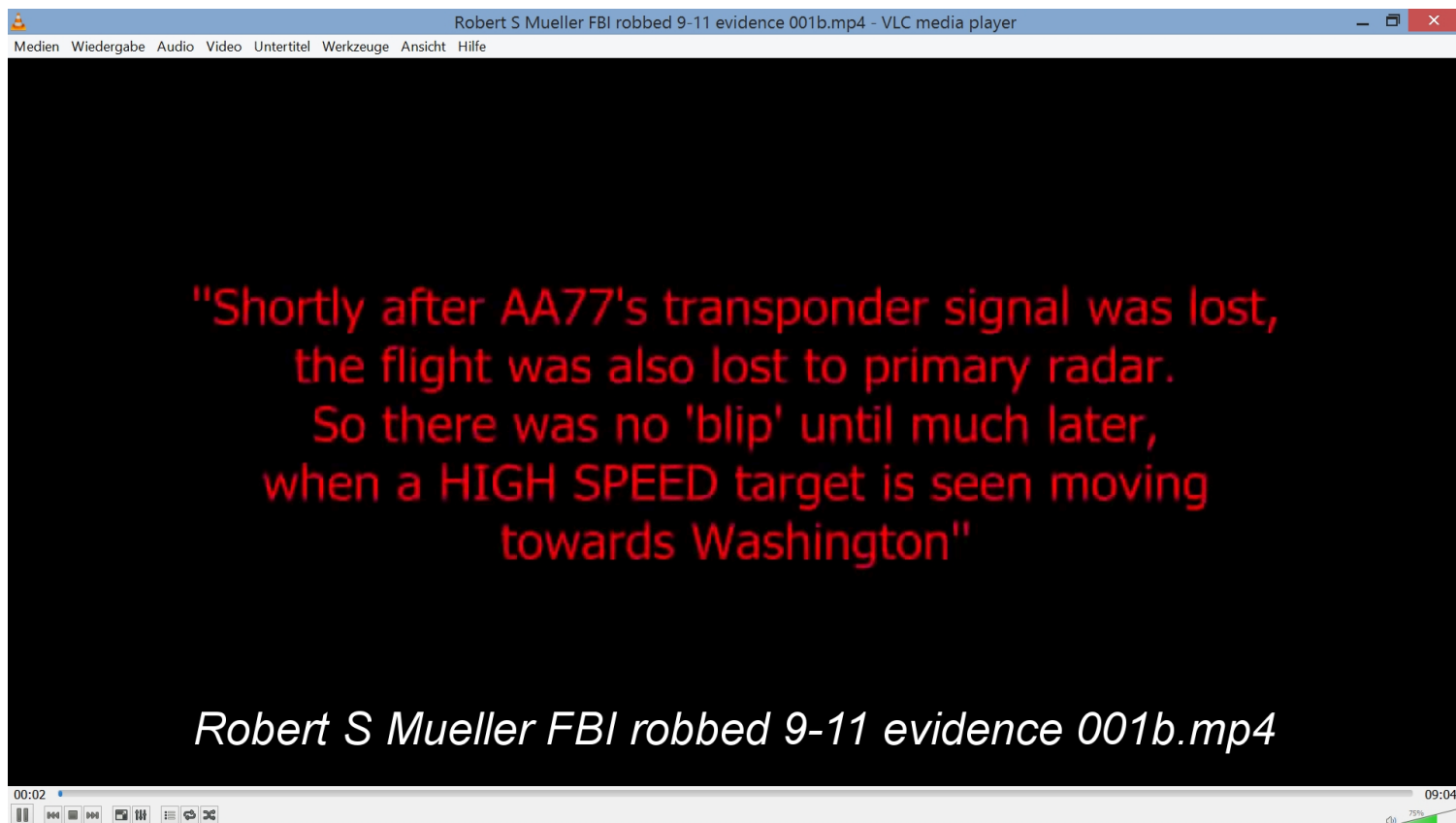












It is difficult to assess if the engine wreckage (of one single engine very incomplete) is the part of a turbine (of two) of the alleged AA77 (a Boeing 757-223), namely, a Rolls-Royce RB211-535 turbofan. Possibly, however, the piece of wreckage, as I assume for much of the wreckage, was hand-placed after the explosion events in order to mislead the public.

There is a photograph from Tuesday, Sept. 11<sup>th</sup> 2001, with afternoon shadows, that gives a fresher impression, with no such engine wreckage being apparent (possibly due to the resolution of the photo.) However, the only wreckage from something flying that could be credible is seen, as small confetti-like scraps, beyond the damaged fire engine (towards and behind the fire house), i.e., at the site of purported first explosion/missile impact by the fire house.

The photo is courtesy PBS, Scott Boatright. I will show the entire photo and two sections taken from the photo.

The entire photo gives a good overview over the long sideways extension of the black part of the facade. The two sections focus on the possible cruise missile confetti after the missile exploded not on, but somewhat in front of, the facade.

Also, in a third section, more to the right, from purported second explosion (alleged crash site of “AA77”), I highlight the rubble field that emerged forward when part of the building came down in c.10 seconds developing a dust cloud featuring thermal updraft. Here, there is clearly to be seen no typical wreckage from any airplane crash.













There is a significant dispute on the internet, following propositions by Rob Balsamo (at the website, [pilotsfor911truth.org](http://pilotsfor911truth.org)) about the g-force that was experienced by the alleged “flight AA77” per government data (from an allegedly retrieved black box.) The following paper is not disputed. It documents that a normal landing at Los Angeles included a descent from 1500 ft to ground in LA in something like 120 seconds. Compared with that, in another graph, is the flight of AA77 that descended from 1500 ft to ground in Arlington County, VA (next to Washington, D.C.) in c.18 seconds (following paper, Fig. 6.) That figures as c.6.6 times as rapid a descent as normal.

The last 14 seconds of alleged flight “AA77” are filled with several unusual rapid vertical accelerations which were physically absolutely impossible given the alleged hit location in a double window of the first floor – the graph indicates, claiming to be government evidence, that in the last c.5 seconds the alleged plane actually ascended (flew from below upwards) into the first floor window. **In other words, it was invisible because it was flying below ground level.** This is shown in Fig. 14 of the following paper (the blue line, vertical accelerations.) The entire data in all charts needs to be collated to show its total impossibility. **The Commission Report (p. 10, with note 61) gave an airspeed of 530 mph while this paper, purportedly based on one and the same set of black box data, indicates a range from c.460 mph to < 500 mph (in Fig. 13 and 6.) This double discrepancy in the government data is inexplicable in the least.**

Tellingly, it is precisely those two authors, Frank Legge and Warren Stutt, who are the main detractors from the good and truth-loving work of Rob Balsamo. Additionally, their Fig. 4 looks impossible except for a roller coaster. Their Fig. 6 does not show the final impossible rise of Fig. 13 (blue line.) Given the fast air speed, the high point on the blue line in Fig. 14 does not coincide with the cutting of the lamp posts in Fig. 8. I doubt they even realize that they were given hogwash as “data”.

It is plausible that the g-force (acceleration force) acting on the human bodies, and on the relatively frail commercial airliner (as compared with an unmanned cruise missile) exceeds the values at which humans (not trained as pilots, not in g-suits), and at which an airliner, can stay in operation.

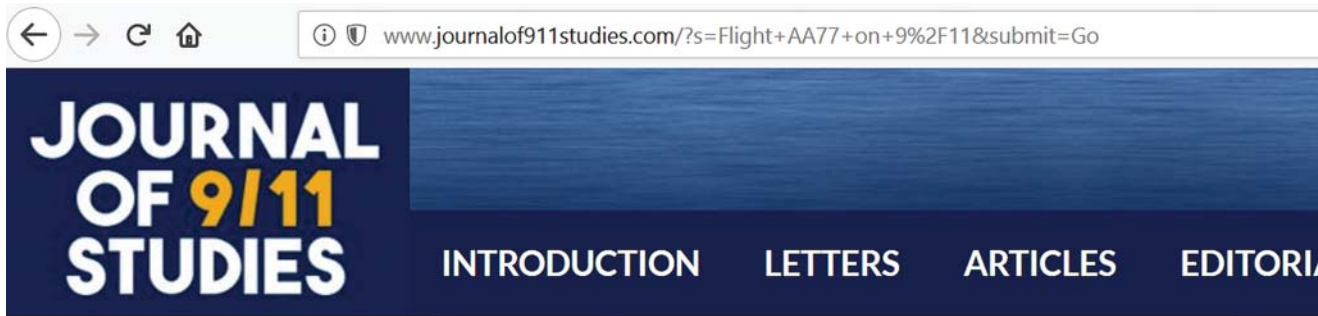
I find that the internet dispute is dishonest, to use an expression that I read on the site [pilotsfor911truth.org](http://pilotsfor911truth.org). The exact values of the g-force are perhaps not that important. It is most improbable that given such g-values (proposed: c.10 and higher, with a high plausibility) the approach flight of alleged “AA77” was a real event (versus a government fiction.)

The following paper, not in dispute, through its graphs provides the basis for the principle of using the g-force for alleged flight “AA77” as physical evidence of the proposed unreal nature of the alleged flight “AA77”. This is thus a key piece of 9-11 science, marked in this instance by unusually vicious attacks from detractors.

My documentation is in this case incomplete as to the detractors which I deem to be emotionalizing and not genuinely responsive. I therefore set them aside.

The paper is followed by a self-correction by Rob Balsamo who published his calculations of the g-force at [pilotsfor911truth.org](http://pilotsfor911truth.org).

Then come two more papers, one from 2017 on the issue, and one brochure from the FAA explaining acceleration and the g-force in aviation.



Search results for: Flight AA77 on 9/11

## Flight AA77 on 9/11: New FDR Analysis Supports the Official Flight Path Leading to Impact with the Pentagon

By Frank Legge and Warren Stutt, January 2011 (To download this document, click the DOWNLOAD ICON in the viewer toolbar.)



# Flight AA77 on 9/11: New FDR Analysis Supports the Official Flight Path Leading to Impact with the Pentagon

Frank Legge, (B.Sc.(Hons.), Ph.D.) and Warren Stutt, ( B.Sc.(Hons.) Comp. Sci.)  
January 2011

## Introduction

The official narrative of the events which have become known as 9/11 includes descriptions of attacks on the World Trade Centre towers and the Pentagon by aircraft on 11 September, 2001. The towers were eventually destroyed and the Pentagon was severely damaged. The account of the attack on the Pentagon includes the following: A Boeing 757, operated by American Airlines, took off from Washington Dulles International Airport at 8:20 a.m. At 8:54 it deviated from its assigned route and at 8:56 the transponder was switched off. The plane, under the control of hijackers, headed back toward Washington and descended. As it approached the Pentagon it performed a descending spiral to the right and finally dived toward the Pentagon while accelerating. It hit some light poles and other objects on the ground and then penetrated the west face of the building at 9:37:44<sup>1</sup> or 9:37:46,<sup>2</sup> depending on source.

Various claims have been made about the attack on the Pentagon. Early claims included damage by a missile or a truck bomb.<sup>3</sup> However, as so many witnesses had reported seeing a large commercial aircraft approaching the Pentagon, these claims received little attention from the public. It was not until the data from the Flight Data Recorder (FDR) was received from the National Transportation Safety Board (NTSB) that serious consideration was given to alternative explanations of the damage. The data was received in two forms, following a number of Freedom of Information Act (FOIA) requests. One form could not be understood by inspection and the other, a readable comma-separated values (CSV) file, had some columns of data missing, a critical omission being radio height.<sup>4</sup> After considerable difficulty, assistance in interpreting the coded file was received and the result came into public hands.<sup>5</sup> Like the CSV file, it appeared to indicate that the flight terminated at a position which was too high to have struck the Pentagon in the described manner.

There has been much debate about the flight path of the plane. One group asserts that the plane approached from a direction which would not have permitted it to create the observed straight line of damage through the light poles and inside the Pentagon. This assertion is based on the group's discovery of 13 eyewitnesses who allegedly place the course of the plane to the north of the former Citgo service station. It is argued from this that the plane must have passed over the Pentagon, despite the existence of a large number of eyewitness reports that the plane hit the building,<sup>6</sup> including some of these 13 north-path witnesses,<sup>7</sup> and despite the absence of the many reports of the plane flying over the building that would be expected, given the large number of vehicles in traffic jams nearby.<sup>8</sup> This theory requires that the long, straight line of complex damage was done by some other means, and done in its entirety without any of the activity being reported.<sup>9</sup>

Another group which studied the FDR data claimed that it would have been impossible for the plane to pull out of the dive which was needed to arrive at the light poles and then level off to hit the Pentagon, as the g-force would produce a wing load greatly exceeding the structural strength of the plane. They assume the data finished close to the Pentagon and argue that the data file proves the official description of the flight false, apparently ignoring the alternative view that the many reports of the plane hitting the building might be indicating that there was a defect in the data.

There have, however, been other interested parties who looked at the available data and came to different conclusions. Researcher John Farmer concluded that there was indeed a defect in the file and that about 4 to 6 seconds of data was missing from the end.<sup>10</sup> If this is true it would be easy to find a flight path which would permit the plane to descend and pull up safely. Despite this finding the adherents of the contrary theories have remained adamant that the plane flew over the building or could not have survived the final pull-up. They continue to maintain that the official account of the path of the plane, which necessarily includes impact with the Pentagon, is false. A number of analyses have been presented which indicate that there are elements of the official account of the attack on the Pentagon which are false but it is our purpose to show that the FDR data is not one of them.<sup>11</sup>

The course of the plane as determined by radar<sup>12</sup> and the course calculated from the FDR are strikingly similar. This supports the view that these are reporting the same plane. Both sources indicate that the plane was approaching from a direction which would make the observed damage possible. Radar, however, is unable to provide accurate information when a plane is close to the ground and the FDR data apparently had the final section of data missing, thus the opportunity for controversy arose.

As people on both sides of this debate assert that a proper understanding of the Pentagon attack is essential if appropriate decisions are to be made, it is clear that collection and examination of further evidence is warranted in the hope that it will lead to a resolution of the dispute.

Some time ago one of the authors, Warren Stutt, who independently received a copy of the FDR file as a result of his FOIA request, discovered more data at the end of the file which had not previously been decoded. He recently managed to decode the last frame and has made the information freely available.<sup>13</sup> The file contains a vast amount of data, including the following essential information: the vertical acceleration every eighth of a second; longitudinal acceleration, roll angle and pitch every quarter of a second; air speed, ground speed, pressure altitude, radio height, heading and position every second; all finishing at points within the last second. The last time stated in the file is 9:37:49, which is in the 4th last subframe. Three more subframes were recorded, one second each, bringing the time of the last recording to 9:37:52, 6 or 8 seconds later than the two official times of impact. We do not assert that this accurately represents the time of impact as the clock in the aircraft may have been incorrect.

## **Discussion**

### **Flight course and final manoeuvre**

In the following image (Fig. 1),<sup>14</sup> it can be seen that impact with five light poles not only establishes the track through the damaged area, but also provides evidence that the wingspan of the plane, if it was a plane,<sup>15</sup> is consistent with that of a Boeing 757, 124 feet 10 inches.<sup>16</sup>





**Fig. 1. Final track through light poles to the Pentagon.**

If the position of the aircraft is plotted using latitude and longitude from the fully decoded FDR file, it becomes apparent that the course obtained is over 200 feet from the course defined by the trail of damage. A method for correcting the position reports was devised, which is described below.

The series of position reports, however, provides the track angle with considerable accuracy. Inspection of the last 20 reported positions prior to the Navy Annex, shows a track of about 61.3 degrees. The possible range of track just prior to impact is limited to about 61 to 63 degrees to ensure that all the correct light poles, and only the correct light poles, will be hit, and that the impact with the Pentagon will occur in the right place.

The above image may be a little inaccurate as it appears that the right wing tip may have brushed a VDOT camera pole, shown in the following photograph (Fig. 2).



**Fig. 2. VDOT camera pole showing damage.**

This pole is close to the light coloured mark near the two blue dots in the lower left corner of the image of the track (Fig. 1), where its position may be located by its shadow. If this contact did occur, the final track angle would be established at about 61.4 degrees, close to the lower end of the range determined by the light poles, and indistinguishable, given the limited accuracy of available measurements, from the track angle prior to the Navy Annex.

The data file shows a bank to the right, reaching about 6 degrees, while the plane is passing the Navy Annex. This apparently was so brief as to have had little effect. After passing the Annex, which occurs at about 4 seconds prior to impact, the bank declines to about 3 degrees. This is held for the last 3 seconds, and then the final recorded bank angle shows a sudden drop to zero. It is therefore surprising to see that the ASCE Pentagon Building Performance Report includes a sketch (Fig. 3) showing a left bank of about 7 degrees, presumably based on impact damage marks.<sup>17</sup>



**Fig. 3. ASCE sketch of impact region.**

It is clear from photographs however that this sketch is misleading, possibly due to a perspective effect arising from the artist's eye being above the aircraft, which has not yet reached the Pentagon. The left wing is shown at the bottom of the row of windows while the photographic evidence places the damage near the top.<sup>18</sup> If allowance is made for this effect, the crucial difficulty that the left engine appears to be partly below ground level is overcome. This engine impacted a low retaining wall, clearly establishing its height as within inches of the ground.<sup>16</sup> Many people have pointed out that the left engine did not mark the lawn.

The following graph (Fig. 4) shows final data file readings to the nearest quarter second. Positive values of roll and control wheel are to the right. Positive pitch is upward.



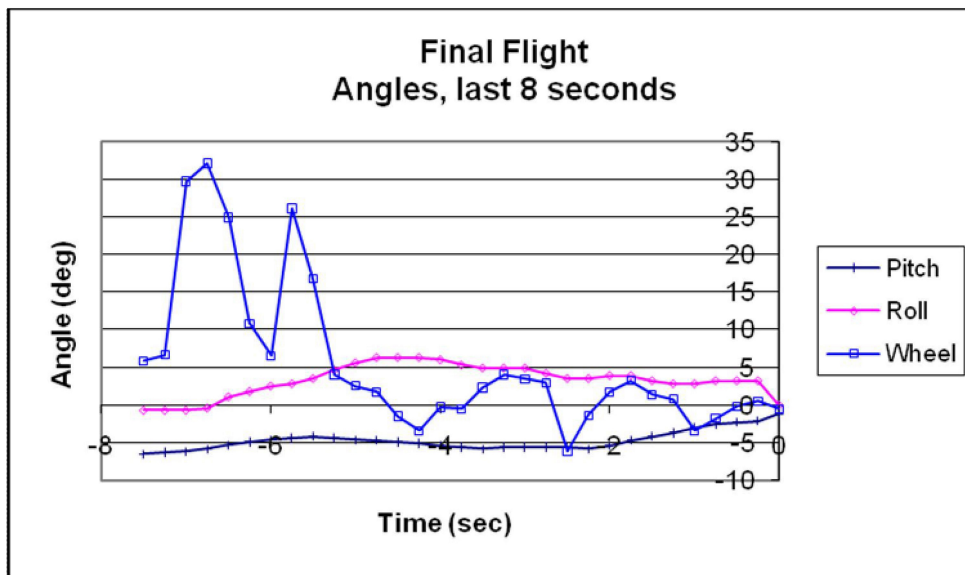


Fig. 4. Graphical presentation of some final FDR data.

A heavy generator trailer had been parked near the Pentagon. Its displacement toward the Pentagon, and damage to its housing, indicate a severe impact occurred with the right engine. As the control wheel is close to central, the very rapid rotation to the left was apparently not commanded and therefore must have been caused by this impact. The roll (bank) recorded in the data file at impact is zero, hence either the right wing, or portion of it, was severed or buckled and projected upwards, or there is some lag in recording the bank angle, or some combination of both. The damage mark of the left wing alone (Fig. 5), being near horizontal, indicates that there was appreciable bank to the left, approximately equal to the dihedral angle, 5 degrees. We see that the facing is fragile and its removal clearly delineates the upper edge of the wing impact area. This image is from a video which pans left and right and shows that the horizontal damage is much longer than shown here.<sup>19</sup> It seems the fuselage may not be banked left as much as might be assumed from the impact marks of the right wing, apparently relied upon by the ASCE.



Fig. 5. Left wing impact mark, near horizontal.

## Height and altitude

We come now to the core argument of this paper. Data from the FDR file provides the graph below (Fig. 6) showing “true altitude”<sup>20</sup> as derived from the raw pressure altitude and “radio altitude” as calculated by adding radio height above ground to ground elevation at corrected positions.

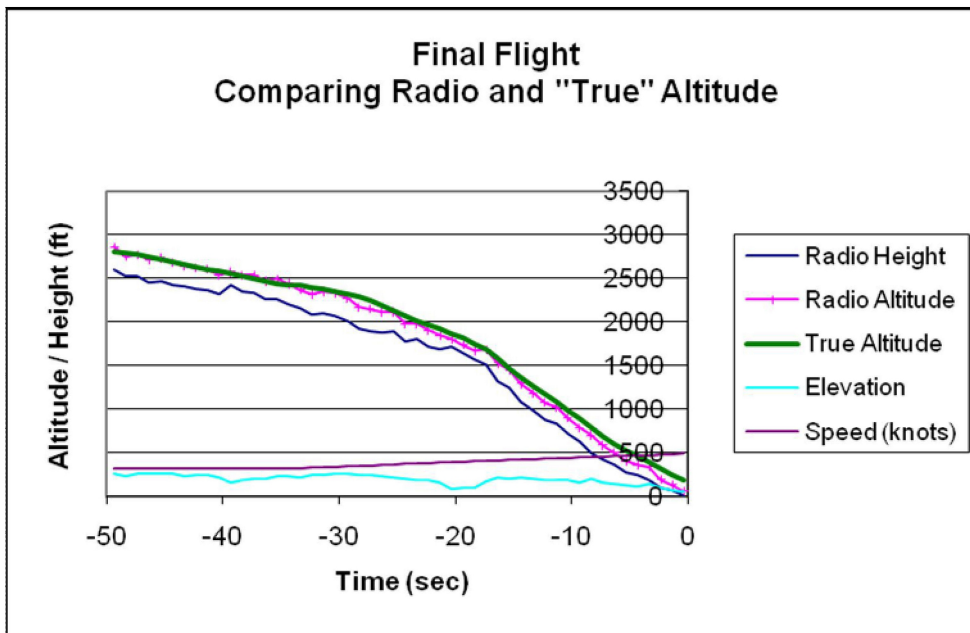


Fig. 6. Divergence observed between altimeter and radio altitude as plane descends.

The elevations were obtained using the *getElevation* method of the United States Geological Survey (USGS) Elevation Query Web Service.<sup>21</sup> The graphs stop short of the y-axis, illustrating that there is a gap of a fraction of a second between the last altitude records and the record of impact. It is immediately apparent that there is a divergence between these two measures of altitude, increasing as the plane descends and speed increases. As accurate knowledge of the altitude of the plane is essential for understanding this event, an investigation of the divergence was undertaken.

It was first necessary to find a means to assess the accuracy of the radio heights. The plane on the ground at Dulles, prior to the final flight, showed a radio height of -6 feet. This is reasonable as the instrument is intended to show zero when the plane is touching down for landing, at which moment the radio antennae will be raised as the plane will be nose-up and the suspension extended. Furthermore there are 11 previous landings recorded on the FDR data file and in every flight the radio heights fluctuate between -5 feet and -7 feet while the plane is taxiing after landing. Most are -6 feet. This is strong evidence that the system was accurate and reliable, at least at low levels. In calculations using radio altitude, 6 feet was added to all readings to remove this offset so that the height of a landed plane would be zero.

The last radio height in the FDR data file is 4 feet. It is clearly of special interest to know the location of the plane when this reading was taken. It was recorded in words 31 and 32 of the final subframe. The final longitudinal acceleration, recorded in word 225, registers impact, as it shows severe deceleration. Each word represents 1/256 of a second, so these readings are 0.758 of a second apart, based on word 31. The last recorded ground speed was 483 knots or 815 feet per second, so the plane has moved 618 feet between the readings. Adding the distance from the nose to the impact point on the wing, about 78 feet, gives 696



feet. This is close to the estimated distance along the plane's centerline from the Pentagon to the third light pole hit, about 692 feet.

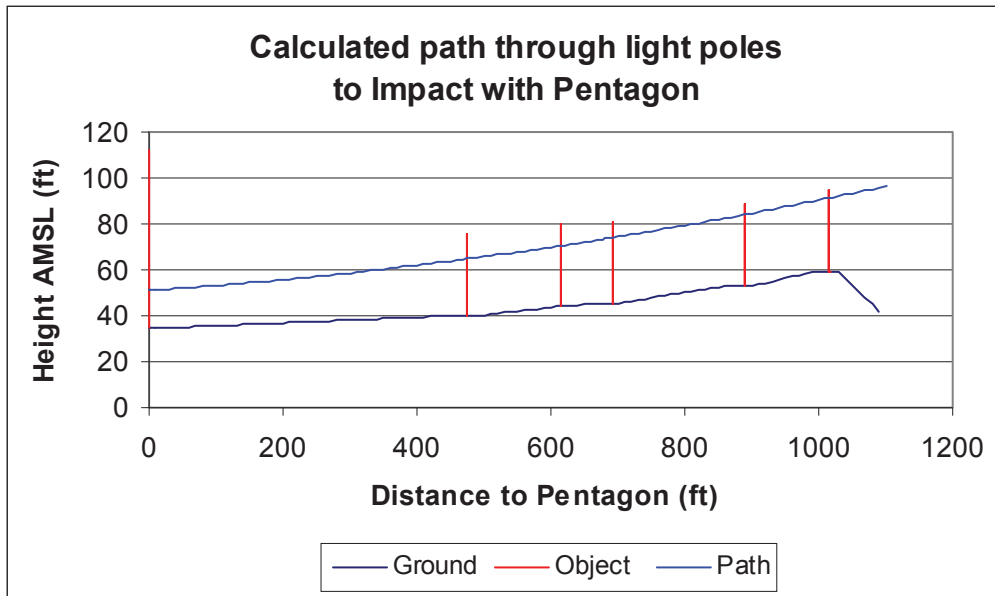
As the FDR file provides the g-force on the plane, and its speed, it is possible to calculate the curvature of the flight path, and thus predict the path the plane will take from the first pole to the Pentagon, and thereby calculate the height of the impact point on the third light pole.

There do not appear to be any published measurements of the impact points on the poles, the vertical portion of which was 36 feet in height. There is, however, a photograph which suggests that about 5 feet was chopped off the first pole by the impact, showing that the plane's wing would have been about 31 feet above ground level.



**Fig. 7. Taxi damaged by felled and severed light pole.**

The vertical acceleration data in the FDR file shows the plane was experiencing a lift averaging 1.8g from the first light pole hit to the Pentagon. The motion of a body travelling in a circle can be specified by any four of the following five parameters: three positions on the circle, the velocity and the centripetal acceleration. In this case we have an estimate of the impact position on pole 1 and on the Pentagon and we also know the velocity and can derive the centripetal acceleration from the g-force, so can calculate a third position. Assuming a flight path which is circular in a vertical plane, calculation shows that, regardless of the exact angle of the plane at impact, the wing would have hit pole 3 between 25 and 26 feet above the ground.<sup>22</sup> Given the uncertainty of various estimates, this is consistent with the last radio height recorded, 4 feet, as an adjustment of 6 feet is needed to correct the reading for offset and a further 14 feet is needed to allow for the height of the wing at the impact point above the ground contact surface of the wheels, totaling 24 ft. The curvature of the final portion of the path, calculated in this way, is illustrated graphically below (Fig. 8). Photographs provide further support for the FDR data as they show the felled and severed poles becoming progressively shorter toward the Pentagon, consistent with the observed final impact point, close to the ground.<sup>23</sup>



**Fig. 8. Final path curvature, calculated using centripetal acceleration and velocity.**

Note that the representation above is an approximation as no attempt is made to incorporate the 3 degree bank through the light poles, as recorded in the FDR file, or the final elimination or reversal of bank after impact with the generator, already mentioned.

The acceleration calculation also shows that the plane would be flying with a downward slope of about 1.2 degrees prior to impact. This provides further support to the FDR data as it shows that pitch has the same final value, -1.2 degrees. This slope would be hard to distinguish from horizontal, and therefore is not in conflict with the very unclear video which was released.<sup>24</sup>

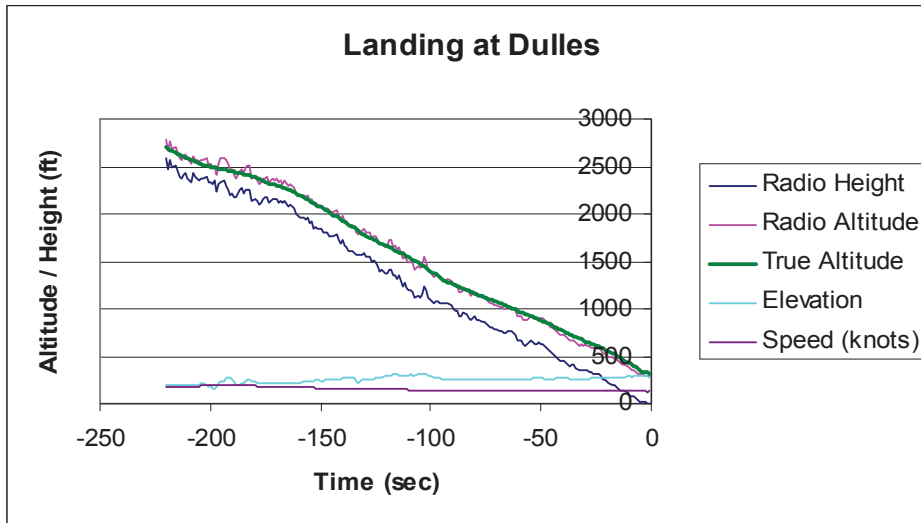
The recording of radio heights commenced on descent at 2590 feet. From this level there were 14 consecutive data points where the air speed was between 312 and 314 knots, at which speed the altimeter should be calibrated to within maximum permitted error, as the speed and altitude are within the normal cruising range. These points, and also the corresponding radio altitudes, were averaged. The difference between these averages was less than 1 foot. The divergence displayed in the first graph in this section (Fig. 6) rises gradually during the descent, reaching 124 feet at the last reading. As the Pentagon is only 77 feet high, the pressure altimeter is indicating that the plane would have easily cleared the building but the series of radio altimeter readings is leading inevitably to impact close to the ground, in accordance with the impact damage.

In order to determine how this behaviour compared with normal operations, the same process was applied to several earlier landings recorded in the data file. In these cases it was noticed that the maximum divergence between true altitude and radio altitude occurred between 10 and 35 seconds before touch-down. To achieve a consistent measure, a running average of 5 points was taken and the maximum value found. Using this procedure, landing at Dulles, the flight prior to the flight to the Pentagon, shown below (Fig. 9), produced a divergence of 52 feet.

As the air speed does not decline much during these last few seconds it seems the sudden reduction in divergence, just prior to landing, may be due to some factor which affects the direction of airflow over the static port, perhaps as a result of the commencement of flare for landing. Alternatively the reduction in descent rate may have diminished the lag, if present. While speculation about airflow and lag may be relevant to research into altimeter performance, it is important to note that this paper does not rely on any knowledge of the

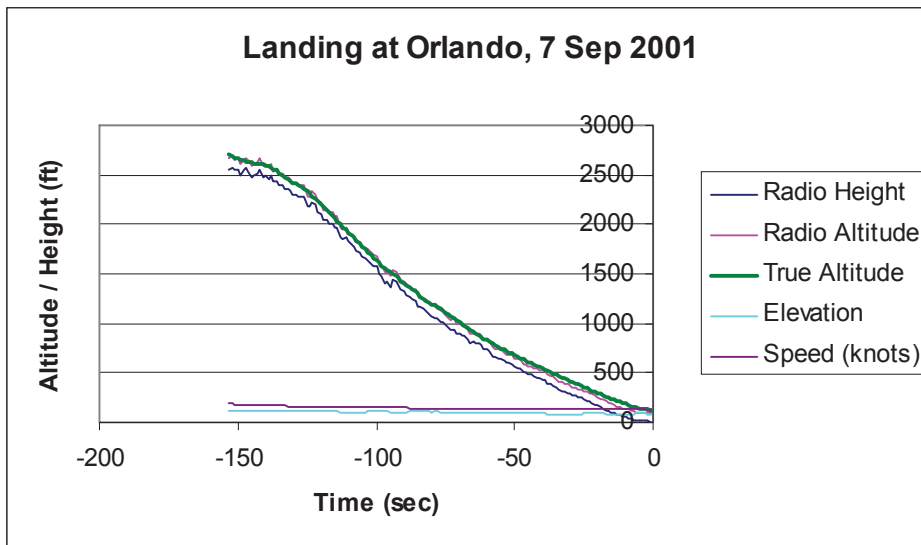


causes of altimeter error as it simply uses the radio height data, together with ground elevation, to assess the altimeter error. The technical term “true altitude” is conveniently brief but may be misleading. It is arrived at by a specific calculation which is no doubt highly accurate, but the value depends on the assumption that the “static pressure”, which is the pressure within the aircraft measuring system, is equal to the pressure outside the aircraft and that the instrument is properly calibrated. This is apparently far from true under some conditions studied here.



**Fig. 9. Normal landing at Dulles, prior to final flight.**

A selection of earlier flights is shown in the following graphs (Figs. 10 to 12):



**Fig. 10. Normal landing at Orlando.**

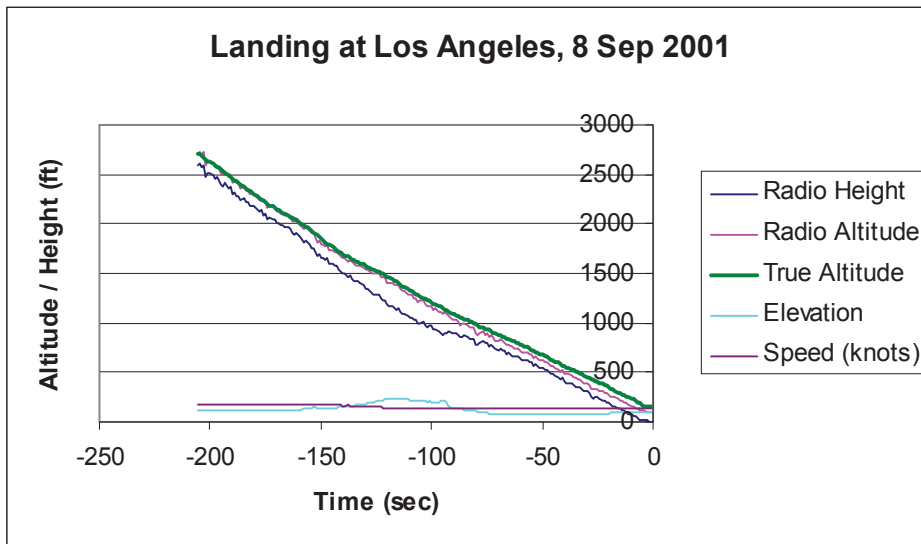


Fig. 11. Normal landing at Los Angeles.

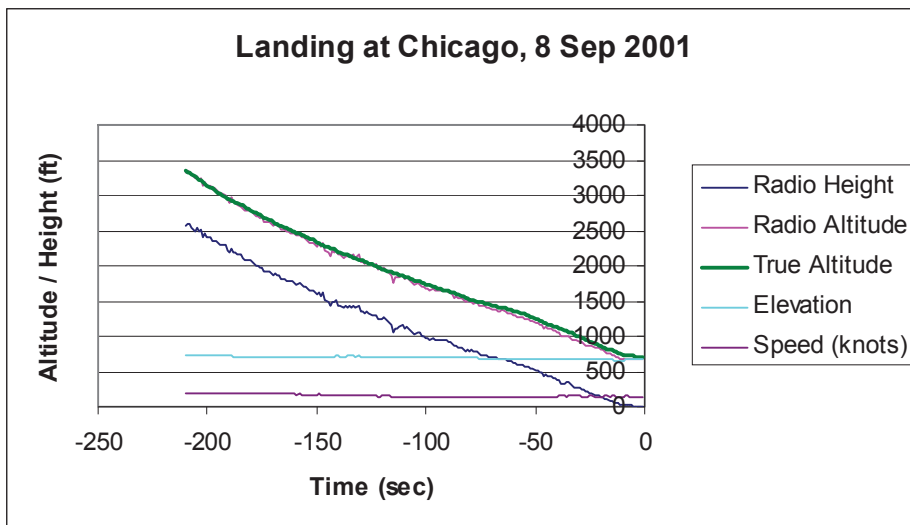


Fig. 12. Normal Landing at Chicago.

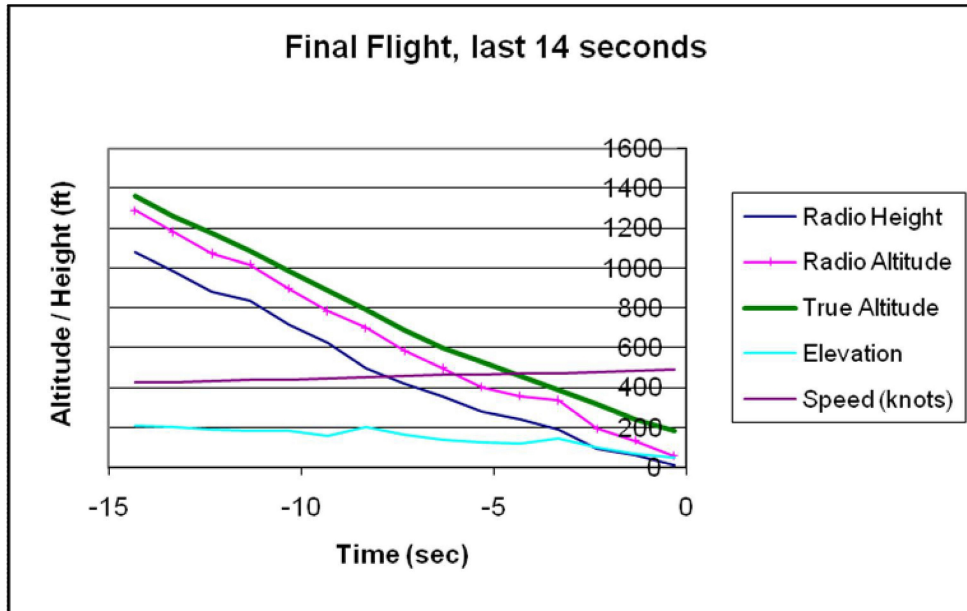
At Los Angeles the divergences were 52 and 83 feet; at Chicago, 52, 63 and 77 feet; and at Orlando, 50 feet. Thus even at normal speeds a significant error, increasing as the plane descends, is consistently found. Whether this is a feature of the Boeing 757, or just this particular aircraft, is not known. An error of this size is of no consequence during normal cruising operations and would cause no problems on final approach for landing as the radio height, and other instruments, would then be used.

It was also noticed that corrections were needed to align the average true altitude with the average radio altitude over the first few data points after the radio height system commenced to operate. These corrections ranged from 1 to 17 feet. In effect the radio altitude was used to calibrate the pressure altimeter. These calibration errors are small and insignificant for normal operations, but slightly increase the uncertainty of the pressure altimeter.

While it may be argued that the radio altitude can have a significant error under cruise conditions, the likely error close to the ground, less than 1 foot, is well established and confirmed here by the study of data in the FDR file, produced while the aircraft was taxiing, as described above.



Inspection of the graphs shows that there are occasional random errors in the radio altitudes. The fourth last radio altitude may be an example of such an error, or it may be the result of an error in the elevation, as it is out of step with its neighbours and with the trend of the altimeter. No such random errors are seen in the altimeter data. The general consistency of the radio trace over the last few seconds, shown in the graph below (Fig. 13), together with the very uniform descent shown by “true” altitude, totally rules out any possibility that the last unadjusted radio height, 4 feet, was recorded while passing over the Pentagon, as has been suggested.

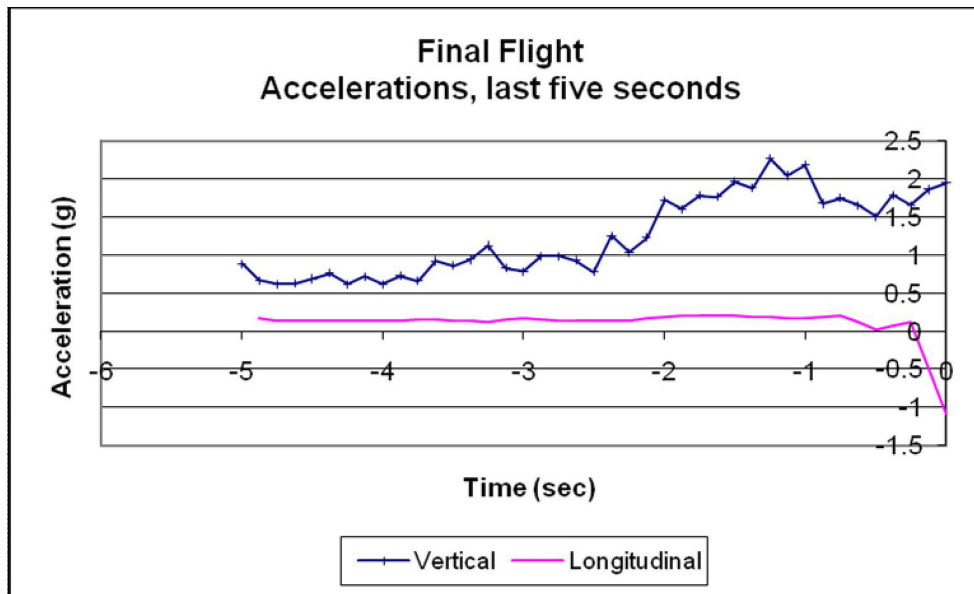


**Fig. 13. Final moments of flight showing divergence between altimeter and radio height, increasing as plane descends and speed increases.**

This analysis clearly shows that the claim that the FDR file provides evidence that the plane was too high to hit the Pentagon is without foundation. It is true that the altimeter indicated that the plane was too high but the radio height system did not. Based on the data and analysis presented above, there is no reason to distrust radio height but there is ample reason to distrust the altimeter on descent at low altitudes, especially at very high speeds.

### Accelerations

The vertical acceleration near the end of the flight shows very high, but not excessive, g-force, indicating that the descent rate is being rapidly reduced, as shown in the following graph (Fig. 14). The longitudinal acceleration shows a severe negative deviation at the end; the maximum value possible in the data file, as would be expected from collision with a substantial object. There is also a dip during the last second, which may be the result of a shock wave running through the structure of the aircraft due to impact with a light pole.



**Fig. 14. The flight terminates, as shown by the severe negative longitudinal acceleration. The vertical acceleration, finally high, is never above the legal limit of 2.5g.**

The vertical acceleration shows a curious pattern. It is not possible for the plane to be controlled in such a way as to produce a motion with the observed high frequency of reversal. It therefore seems likely that some part of the plane is fluttering, as occurs with excessive speed. It is interesting that this does not appear till about 4.5 seconds before impact, at which point the plane has accelerated to about 470 knots, significantly above the “maximum dive velocity”, 410 knots. As fluttering will eventually damage or destroy an aircraft, this observation may give an indication of the size of the air speed safety margin, a figure which does not appear to be available to the public.

As already mentioned, it has been asserted by one group that it would be impossible for the plane to survive pull-up after passing over the Virginia Department of Transportation (VDOT) radio antenna tower, as it would require a wing loading of over 10.14g. This claim is, however, easily shown to be incorrect. It results from an unfounded assumption that the plane would have travelled in a straight line from the tower to the first light pole before commencing the pull-up. The graph above (Fig. 14) shows that this assumption is not justified, as a strong g-force commences at about 2 seconds prior to impact, while the first pole is not hit until about 1.3 seconds prior to impact. Also their calculation has been shown to contain a large mathematical error, which more than doubles the force required.<sup>25</sup>

The FDR data also shows that vertical acceleration drops below 1 passing by the VDOT tower, which occurs at about 4.25 seconds prior to impact (Fig. 14). This observation indicates that the descent steepened as the plane passed the tower, thus setting up a curved course which would have enabled avoidance of excessive g-force. The data file confirms that pull-up commenced before the first pole, already identified by the increased g-force, as it shows the downward pitch declining during the last two seconds (Fig. 4).

If the plane is allowed to pass over the antenna at a steeper angle and fly a curved path, spreading the pull up over a wider arc, calculation shows that the g-force required can be reduced to a level substantially below the plane’s legal limit of 2.5g.<sup>25</sup> This calculation is in accordance with the data file as the peak force, experienced briefly, is 2.26g (Fig. 14).

The FDR file, after correcting the position reports as described below, shows the plane passing above and a little to the south of the VDOT antenna tower and then continuing to follow a course corresponding with the official account.



## Altimeter errors

It is a requirement in the USA that above 18,000 feet the pilot must set the altimeter to standard pressure, 1013.25 hPa, but prior to take-off it is set so that it reads the elevation at the airport. The data file recorded the altitude of the plane on the ground at Dulles, from where the final flight began, as 40 feet. Atmospheric pressure at the time was 1023.23 hPa and temperature was 18°C, 3 degrees above standard temperature. If the pressure and temperature difference from standard atmosphere is allowed for, calculation shows the displayed altitude would rise 272 feet, reaching 312 feet, which is the published elevation for Dulles International Airport.<sup>26</sup> The adjustment may be confirmed using this calculator: [http://www.luizmonteiro.com/Learning\\_ALT\\_Errors\\_Sim.aspx](http://www.luizmonteiro.com/Learning_ALT_Errors_Sim.aspx)

It is therefore apparent that the data file recorded raw altitude at Dulles in terms of standard pressure and that no error was present at the time. It was as though standard pressure had been set on the altimeter. Examination of the previous flights on the file showed that the recordings were all based on standard pressure, as no transitions between local and standard pressure are observed.

US Federal Aviation Regulations appear to permit an altitude error up to +/- 30 feet per 100 knots,<sup>27</sup> which would give a maximum permitted error on final approach, ranging from 130 to 140 knots in the data file, of 39 to 42 feet. In none of the sets of landing data examined was the discrepancy with radio height greater than 17 feet when recording of radio height commenced, hence there is no reason to suspect that the altimeter was malfunctioning or badly out of calibration, yet the observed errors were 50 to 83 feet just prior to normal landings. It therefore appears that this calibration standard is not applied at low altitudes.

## Position report errors

The data file shows that the course position error at take-off from Dulles is much greater than the error at the end of the final flight. The large error at the beginning may have resulted from drift of the inertial navigation system while the plane was on the ground. These errors are apparently largely corrected during flight, presumably by reference to Distance Measuring Equipment (DME) and VHF Omnidirectional Radio Range (VOR), which provide distance and direction from ground stations. Also available at the time was the Global Positioning System (GPS). Significant position errors were nevertheless noticed in the data from most of the normal landings described above, and corrections were made. It was noticed that the errors became larger while the plane was taxiing toward its parking spot, at which time it would presumably be too low to receive DME and VOR correcting signals. It may seem surprising that GPS was not correcting drift, but the NTSB has released a document which lists GPS as “not working or unconfirmed”.<sup>28</sup>

The errors in the data file position reports were corrected by creating a file consisting of every fifth position report and applying the positions to Google Earth maps. In the case of the 11 landings prior to flight 77, each plot was inspected to identify the position where the plane turned off the runway onto a taxiway. The differences in latitude and longitude between the plotted position where the plane turned and the junction with the taxiway were used to adjust the data file values. Only landings in which the turn off position could be clearly established were used in this work. The average latitude error was 329 feet and the maximum error was 1197 feet. The average longitude error was 663 feet, maximum error 1410 feet. It is clear from this study that the position reports produced by this aircraft were prone to error, producing recorded tracks which were parallel with, but offset from, their real tracks. It is therefore not surprising that this was also found to be the case with the final flight.

A method similar to that used to correct landings was used to correct the final flight. The last position report is recorded 166 words prior to the recording of impact. This represents a distance travelled of 528 feet, as may be determined using the details in the calculation at the foot of page 6. Adding the distance from the nose to the accelerometers, about 75 feet, gives 603 feet. The last position report was therefore created about 603 feet along the centerline of the aircraft from the face of the Pentagon. There is of course appreciable uncertainty in this figure as there may have been some crushing of the nose before the high deceleration was recorded. Also we have been unable to determine whether there is any software adjustment made to the position reports within the plane before they are recorded. Any such errors would be small and would have negligible effects on the calculations and conclusions of this paper as their only effect would be to alter by a few feet the location at which each ground elevation was taken. The latitude error was found to be about 42 feet and the longitude error about 392 ft, well below the averages for the previous flights.

The last DME distance from the facility at Reagan National Airport was 1.25 nautical miles. As these measurements have a resolution of 0.25 nautical miles, this is consistent with the calculated position of the final DME report, being 1.3 nautical miles, as measured using Google Earth.

### **Time discrepancies**

After adjusting the timeline in the CSV file by adding 4 seconds throughout, the data lines up with the FDR file. This file still finishes 4 seconds earlier than the FDR file, due to omission of the last four seconds of data. We do not assert that either of these files has the timeline correct. It could be that the clock in the plane was incorrect, hence adjustment might have been appropriate.

### **Decoding errors**

It is perhaps not surprising that the unofficial decoding, utilized in previous studies, failed to recognize and provide information from the incomplete final frame. It must be common, however, for the last frame of a data file to be incomplete when the recording is terminated by a crash, hence one would expect the official procedure, used by the NTSB, to provide a complete decoding. Apparently, in this case, it failed to do so.

Warren Stutt has now taken the study of the FDR data a stage further. He discovered that the failure of the NTSB to decode the last frame was caused by unrecorded error correction codes towards the end of the FDR data. Apparently the software used to decode the file was unable to handle this situation correctly. His initial decoding was successful because it did not use error correction. He then found that if he put the correct codes into the last two pages of the original file, the ROSE software produced a complete decoding which exactly matched his previous decoding. Some earlier flights recorded in the FDR file also had incomplete final frames but these contained error correction codes and were properly decoded. It is apparent that proper error correction codes are necessary for the software available at the time to correctly decode a final partially written frame. It appears that the NTSB may not have been aware that final error correction codes could, in some cases, be missing, causing truncation of the data.<sup>29</sup> It seems likely that the previous unofficial decoding was also affected by the same problem.

The ROSE software is supplied by the firm which manufactures the FDR. This firm has not confirmed that the problem described here has been addressed in the current version of their software. This is clearly an important issue as the last frame could be vital to a crash investigation.



As the range of possible errors is very large it may be difficult to design software which will always operate correctly. Rather than use software designed to correct errors it may be safer to use software designed to simply flag errors for human analysis.

## Summary and Conclusion

In response to FOIA requests the NTSB provided a CSV file and a coded FDR file. All contradictions between the official account of the course of flight AA 77 and these files appear to be traceable to missing data. In the case of the CSV file the data stopped about four seconds short of the impact. In the case of the FDR file the final frame was not initially decoded. Some researchers recognized that data was missing, while others claimed that the files proved the official account was false, as it appeared the flight terminated at a point too high to have created the observed damage trail on the ground.

Previous analyses were further confounded by uncertainty of the position of the last data point; failure to consider possible calibration errors in the pressure altimeter data, caused by high speed and low altitude; and false information in the NTSB flight animation.

The recent complete decoding of the FDR file has enlarged and clarified the information available and has thereby enabled resolution of the contradictions. It is clear that this file supports the official account of the course of flight AA 77 and the consequent impact with the Pentagon. The file thus also supports the majority of eyewitness reports.

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<sup>1</sup> Wikipedia on American Airlines Flight 77, gives impact time 2 seconds earlier than the 9/11 Commission: [http://en.wikipedia.org/wiki/American\\_Airlines\\_Flight\\_77](http://en.wikipedia.org/wiki/American_Airlines_Flight_77) based on the NTSB report:

[http://www.nts.gov/info/AAL77\\_fdr.pdf](http://www.nts.gov/info/AAL77_fdr.pdf)

<sup>2</sup> 9/11 Commission Report, page 10: <http://www.9-11commission.gov/report/911Report.pdf>

<sup>3</sup> 9/11 Research, general discussion of alternative theories:

<http://911research.wtc7.net/pentagon/analysis/theories/index.html>

Discussion of the 5 video frames, the confusing nature of which promotes unscientific speculation:

<http://911research.wtc7.net/pentagon/analysis/videoframes.html>

<sup>4</sup> The technical term “radio height” is used throughout this paper. This is often called “radar height” but that is confusing as the type of signal used is not conventional radar, which measures the time taken for a reflected pulse to return. The radio altimeter uses a continuous frequency modulated beam and measures the phase shift of the returning signal. This is far more accurate for short distances. The system measures, records and displays to the pilot, the height of the aircraft above the ground.

<sup>5</sup> Calum Douglas explains how the files were obtained and dealt with here:

<http://video.google.com/videoplay?docid=2833924626286859522#> The animation obtained from NTSB, which he shows speeded up and complete, is clearly flawed as the track is incorrect and, like the CSV file, it terminates too soon. The NTSB has stated that this animation was not used for any official purpose.

<sup>6</sup> 9-11Research, Analysis of eye witness reports:

<http://911research.wtc7.net/pentagon/analysis/conclusions/jetliner.html>

<sup>7</sup> Sarns, C, a study of eyewitness video interviews: <http://csarnsblog.blogspot.com/>. Of the 13 north path witnesses claimed, the 5 who were in a position to see the Pentagon reported they saw the plane hit the Pentagon or fly so low it could not miss. One has to ask whether the traumatic image of the plane hitting the Pentagon, or the image of the prior path of the plane, would be more reliably held in memory.

<sup>8</sup> Hoffman, J, “*Critiquing the Pentacon*”: <http://911research.wtc7.net/essays/pentacon/index.html>

<sup>9</sup> Damage at the Pentagon: A very large number of small fragments of what appeared to be the lighter parts of a plane were scattered over a wide area and a massive amount of larger fragments was found inside the Pentagon. These included a wheel and motor parts identified as from a Boeing 757. The damage trail included 5 light poles, a fence and a generator trailer. The hole in the wall of the Pentagon, estimated to be 96 feet wide, was ample to admit the heavy parts of the plane. Within the Pentagon the support columns were bent and broken in the direction of travel. See photographs and discussion here:

<http://www.journalof911studies.com/volume/2009/WhatHitPentagonDrLeggeAug.pdf>. The depth and spread of debris which flowed out through the “exit hole” indicated that a substantial avalanche of material had hit the wall. See [http://911research.wtc7.net/essays/pentagon/docs/punchout\\_rv.jpg](http://911research.wtc7.net/essays/pentagon/docs/punchout_rv.jpg)

<sup>10</sup> It appears Farmer has removed links to his work. His conclusion however has been quoted in numerous places, for example: <http://arabesque911.blogspot.com/2009/07/misinformation-flight-77-flight-path.html>

<sup>11</sup> It is not our position that we have proved the data file authentic. It is of course impossible to do so. However the file is such a vast collection of inter-related information that it would be extremely difficult to manipulate without leaving evidence in the form of items which did not correlate correctly. We have not found any such evidence. That is sufficient for the case we develop.

<sup>12</sup> Radar data displayed on map: <http://i27.tinypic.com/1zgimq.png>

<sup>13</sup> Stutt, W: <http://www.warrenstutt.com/>

<sup>14</sup> Bart, E: [http://www.historycommons.org/events-images/317\\_pentagon\\_approach.jpg](http://www.historycommons.org/events-images/317_pentagon_approach.jpg)

Later versions of this image have additional “exit holes” marked. It is important to note that these are incorrectly labeled. They are not places where plane debris broke through the wall but doors through which smoke escaped, as can be seen in this photograph:

<http://i14.photobucket.com/albums/a327/lytetrip/Pentagon/rollupdoor3.jpg>

<sup>15</sup> It would be painfully tedious to repeat the phrase “if it was a plane” every time the word “plane” or “aircraft” is used. It is to be understood, where relevant, throughout.

<sup>16</sup> Hoffman, J on the physical evidence: <http://911research.wtc7.net/essays/pentagon/index.html>

<sup>17</sup> ASCE Pentagon Building Performance Report: <http://fire.nist.gov/bfrlpubs/build03/PDF/b03017.pdf>

<sup>18</sup> 9/11 Review.com, see the Will Morris photo: <http://911review.com/articles/stjarna/eximpactdamage.html>

<sup>19</sup> Left wing impact mark. This image was taken from the video recently released as a result of a FOIA request: <http://911blogger.com/news/2010-12-22/new-pentagon-videos-foia-release>

<sup>20</sup> As static pressure was not available from the FDR file two steps were required. First, static pressure was calculated from the raw altitude data, then true altitude was calculated from static pressure.

Static pressure (in Hg) =  $29.9213 * (1 - 0.0019812 * A / (273.15 + 15)) ^ (32.174 / (0.0019812 * 3089.8))$   
where A = raw altitude (ft).

True Altitude (ft) =  $((273.15 + T) / 0.0019812) * (1 - (P / S) ^ (0.0019812 * 3089.8 / 32.174))$

where T = temperature at sea level (deg C); P = static pressure (in Hg); S = altimeter setting (in Hg).

<sup>21</sup> USGS Data Service: [http://gisdata.usgs.gov/XMLWebServices2/Elevation\\_Service.aspx?op=getElevation](http://gisdata.usgs.gov/XMLWebServices2/Elevation_Service.aspx?op=getElevation)

<sup>22</sup> Assumptions used in calculation: Elevation at the base of pole 1 is estimated to be 59 feet AMSL using the embankment height each side of Columbia Pike. The impact point on pole 1 appears to be about 31 feet above ground level. Ground level at pole 3 is 46 feet and at the Pentagon 34 feet. We assume the impact with the generator simply rotates the plane about its C of G and has negligible vertical effect. The impact point on the wings would be about 39 ft from the centerline and 14 feet above ground when parked. The lowest part of the motors is 2 ft above ground when parked. While the sketch in the ASCE Pentagon Building Performance Report indicates the plane was banked left about 7 degrees, presumably based on wing tip damage, the FDR data file shows a bank of zero. It is therefore appropriate to find the sensitivity of the calculation to the bank at impact. Varying the assumed bank from 3 to 7 degrees alters the calculated impact point on pole 3 over the range 25.2 to 25.7 feet; not significantly different, given the uncertainty in various estimates. Assuming a left bank of 5 degrees and a ground clearance of 0.5ft, the fuselage would be centred about 15 feet above ground on impact with the Pentagon. The distance from pole 1 to pole 3 is 335 feet. From pole 3 to the Pentagon is 692 feet. These distances were obtained using Google Earth, care being taken to select the archived map from September 2001, which shows the impact damage. The elevations are from USGS.

<sup>23</sup> Pentagon light poles: <http://www.scienceof911.com.au/pentagon>

<sup>24</sup> Judicial Watch FOIA request: <http://www.judicialwatch.org/archive/2006/flight77-1.mpg>

<sup>25</sup> Clinger, W: <http://www.cesura17.net/~will/Ephemera/Sept11/Balsamo/balsamo2.html>

<sup>26</sup> Dulles International Airport: <http://www.airnav.com/airport/KIAD>

<sup>27</sup> Wikipedia, Altimeter errors: [http://en.wikipedia.org/wiki/Position\\_error#cite\\_ref-5](http://en.wikipedia.org/wiki/Position_error#cite_ref-5)

<sup>28</sup> NTSB factual report on Digital Flight Data Recorder: [http://www.nts.gov/info/AAL77\\_fdr.pdf](http://www.nts.gov/info/AAL77_fdr.pdf)

<sup>29</sup> Stutt, W, Apparent bug in ROSE software: <http://www.warrenstutt.com/ROSEBugReport24-10-10/index.html>. An update on this problem to reflect the findings reported in this paper has now appeared on his web site: <http://www.warrenstutt.com>. Expect further reports on receipt of responses to his correspondence with NTSB.



## Navigation

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## Arlington Topography, Obstacles Make American 77 Final Leg Impossible

By Rob Balsamo, Pilots For 9/11 Truth

Update - 12/12/08

It appears some are still confused regarding the corrections of the below article and still do not understand that the video presented which contain the proper formula's as determined by Aeronautical Engineers is a "correction" to our article below. This update is to inform those who are still confused that the presentation of "9/11: Attack On The Pentagon" and the "G Forces" clip below offered for free, is the correction to our admitted math errors from our original article. For most this is not in question. For those who make excuse for the govt story, apparently they are still confused and still quote the 11.2 G's of the original article wondering when we are going to "correct" our mistakes, yet anyone who actually views the video presentation will readily realize such errors have been corrected.

Those who do make excuse for the govt story feel we should delete our errors in the original article below. We disagree. We show our errors and work through them. To date, this is the only article on this site which we have made mistakes and have since corrected the errors as shown in the video presentation directly below this update. Thank you for your understanding and we apologize for any confusion.

Update - 09/15/08

Please review our "[Lack Of Foundation Damage](#)" article which is a supplement to this article.

### G FORCES - Scene From 9/11: ATT...



An update to Pilots For 9/11 Truth Arlington Topography and Obstacles Article.

"G FORCES", a scene from the new film "9/11: ATTACK ON THE PENTAGON" produced by professional pilots, Aeronautical Engineers and physicists analyzes the G forces required for a 757 to negotiate the Arlington region on September 11, 2001 based on flight data provided by the US Govt. For full high quality film and detailed description, please visit <http://pilotsfor911truth.org>.

05/01/08 - Update: For those who have been visiting this page on a regular basis anticipating a revision to our calculations below, please be advised we are continuing our efforts to revise this article. In order to be as thorough and as accurate as possible, the majority of our time has been occupied with building an accurate scale model of the Arlington area, complete with obstacles, topography and other details. The scale model of Arlington is now in its final stages of construction. We are currently in the process of assembling a presentation to be published with respect to the original premise of this article along with addressing numerous other issues. In the interest of accuracy, the fact we are taking this presentation to a whole new level, and due to limited resources, this has been proven to be a lengthy task. We offer this clip to better understand and appreciate the detail and complexity of our upcoming presentation regarding this article along with other issues that will be addressed. Keep in mind the following clip is a low

quality "rough draft" sample of another issue we will be addressing within the "revision".

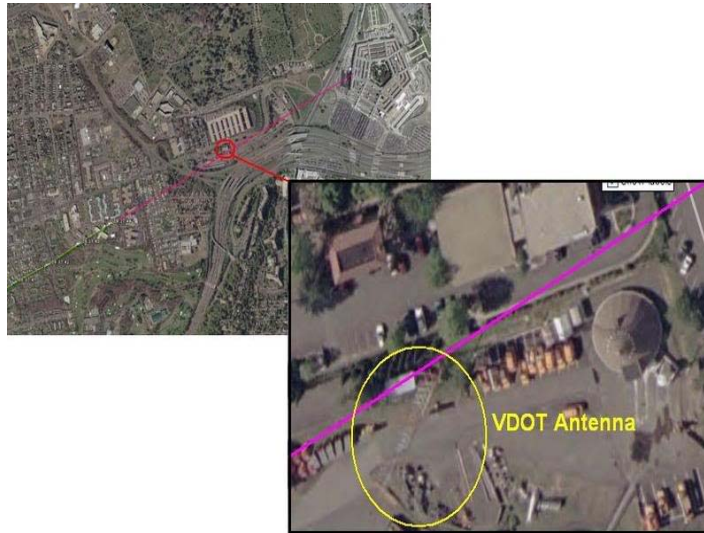
We hope to have the full presentation published sooner than later. Timing depends on schedules, organization obligations/priority, and of course resources. If you wish to help our progress, please consider making a donation by clicking the Donation button in the left margin or ordering a DVD in our [DVD Section](#). As always, feel free to email us with any questions you may have. We appreciate your patience and thank you for your support.

03/20/08 - Update: For those who have been following the thread linked in the right margin, this will be redundant. The calculations below used for the purpose of this article are in error. We are currently reviewing the calculations and will publish a revision with the proper formula(s)/calculations consistent with the premise of this article. We apologize for any confusion and thank you for your understanding.

03/13/08 - "Beware The Ides Of March" could not be a more appropriate introduction to this article as it appears the government story regarding the events at the pentagon is officially dead. Thanks to the hard work done by Citizen Investigation Team, they alerted us to review figures regarding topography and obstacles along the flight path of American 77 according to the government story. Physically and aerodynamically, Arlington's unique topography and obstacles along American 77 "final leg" to the pentagon make this approach completely impossible as we will demonstrate.

According to the government, American 77 final approach to the pentagon is depicted below.

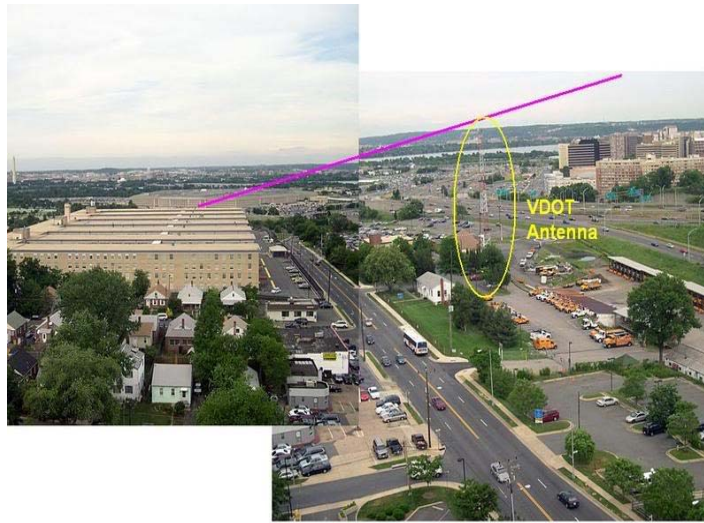
(Picture Courtesy Citizen Investigation Team, Click to Enlarge)



You'll notice the Virginia Department Of Transportation (VDOT) Antenna rising from the ground in the reported flight path of American 77. This antenna has been determined to be 169 ft above the ground with a ground elevation of 135 feet (FCC Registration Number 1016111).

(Picture Courtesy Citizen Investigation Team, Click to Enlarge)





For those who have seen Pandora's Black Box - Chapter Two - Flight American 77, you will recall the government claims American 77 struck down light poles on Washington Blvd of which the first pole is 2400 feet east of the above antenna. The topography in this area slopes down significantly once east of the Navy Annex/VDOT Antenna on its way to the Pentagon. The ground elevation of the Pentagon is 33 feet according to USGS.

Based on this topography combined with the height of the VDOT Antenna protruding into the reported flight path of American 77, it is aerodynamically and physically impossible for this aircraft to have performed the way the government would have us believe.

Top of VDOT Height = 304 MSL (above sea level)

Top of Pole 1 height = 80 MSL

Difference = 224 feet descent required.

Distance between VDOT - Pole 1 = 2400 feet

2400/Speed 781 feet per second (according to Flight Data Recorder) = 3 seconds

224/3 seconds = 75 fps descent rate x 60 = **4480 fpm** descent rate needed to reach top of pole 1 from top of VDOT Antenna.

Pole 1 distance to Pentagon = 1016 feet

1016 feet/781 fps = 1.3 seconds

4480 fpm descent needs to be arrested within 1.3 seconds.

75 \* 1.3 = 97.5 foot descent within 1.3 seconds.

97.5/32 fps accel due to gravity = 3.0 G's + 1 G = **4.0 G's** needed to arrest descent within 1.3 seconds and 97.5 feet vertically. **However, 97.5 feet vertically is not available.**

Top of pole 1 height = 80 MSL

"Impact hole" height = 33 (pentagon ground level) + 12 feet (center of pentagon hole height) = 45 MSL

80 feet (top of pole 1) - 45 (height of "impact hole") = **35 feet vertically available to arrest descent rate of 4480 fpm.**

97.5/35 = 280% (G Load required to arrest 4480 fpm descent rate within 1.3 seconds and 97.5 feet vertically **needs to be increased by 280%.**)

280% x 4.0 G's = **11.2 G's** needed to arrest descent.

Conclusion = Impossible for any transport category aircraft to descend from top of VDOT Antenna to top of pole 1 and pull level to "impact hole" as reported by the government story and seen in the DoD "5 Frames Video". 11.2 G's was never recorded in the FDR. 11.2 G's would rip the aircraft apart.

This does not account for response time to initiate the arrest. Increased time is needed or higher altitude at pentagon in order to be within aircraft structural limits, or higher peak G loads. The VDOT Antenna was present on September 11, 2001, and was not struck by any object.

Transport Category aircraft are limited to 2.5 G's positive and 1.0 negative. Although there is a margin of error built into these limits, it is not anywhere near 448% or 11.2 G's positive. Aerobatic Category Aircraft have a positive G load limit of 6.0 G's. Some may argue that the flight path "just missed" the VDOT Antenna, in which case we also worked out the numbers if the aircraft were at ground level at the antenna. The G loads required would be ~4.3 G's. Still excessive for a transport category aircraft. Not to mention the aircraft certainly was not at ground level abeam the Navy Annex and such G loads were never recorded in the Flight Data provided by the NTSB. Feel free to input the numbers yourself using above calculations as a guide and ground elevation of antenna.

Pilots For 9/11 Truth is an organization of aviation professionals from around the globe. The organization has analyzed Flight Data provided by the National Transportation Safety Board (NTSB). The data does not support the government story. The NTSB/FBI refuse to comment.

<http://pilotsfor911truth.org/core.html> for full member list.

Special thanks to the [Citizen Investigation Team](#) for bringing this to our attention and for providing above pictures.



*Pilots For 9/11 Truth*

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July 2, 2009

Updated Sep. 11, 2017

The Wisdom Fund

## Pentagon 9/11: Scientific Evidence Proves Official Account of 'Flight 77' Is False

**Given the topography, the force generated by the transition of 'Flight 77' from its downward path to level flight would cause the aircraft to crash before striking the Pentagon**

by Enver Masud

**FREE ebook** — "9/11 Unveiled" (Arabic, Chinese)  
**American Patriots** — Muslims didn't do it

A simple formula, familiar to high school students, can be used to refute the official account of American Airlines Flight 77 -- alleged to have struck the Pentagon on September 11, 2001.

Force = *Mass X Velocity Squared / Radius*

This formula approximates the force that would be exerted on an aircraft when it transitions from its downward path to level flight.

First we determine the mass of the aircraft.

Flight 77, a Boeing 757, had taken off from Washington Dulles International airport, and was bound for Los Angeles. Assuming its fuel tanks were full, and ignoring the weight of the 64 passengers, and cargo (which should be available if one wants to include them), the weight of the plane would be about 255,000 pounds (Boeing Technical Specifications).

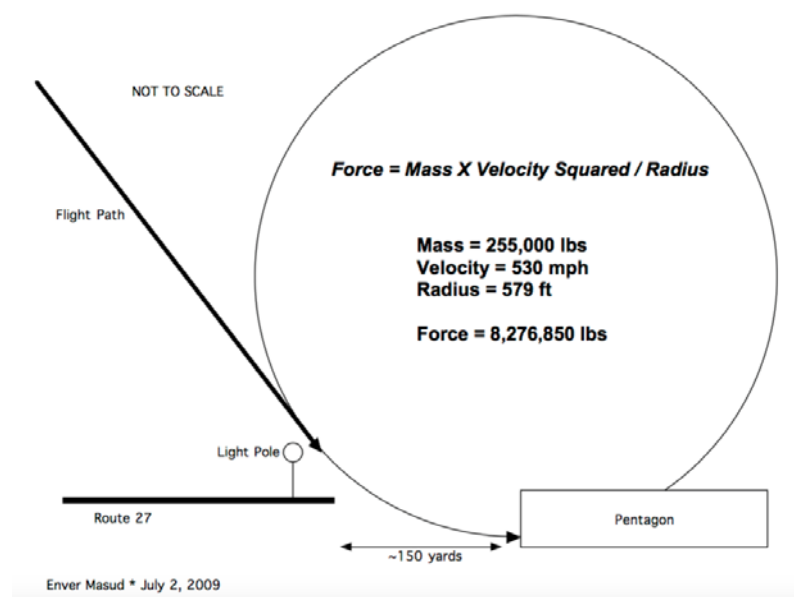
For our calculation we'll assume that weight and mass are equal, i.e. 255,000 pounds.

For velocity we turn to the official account that Flight 77 struck the Pentagon at "530 miles per hour" (The 9/11 Commission Report, p10).

For our calculation we'll assume that speed and velocity are equal, i.e. 530 mph (speed is a scalar and velocity is a vector).

To calculate the radius, we could begin with a statement in The 9/11 Commission Report (p9): Flight 77 was "5 miles west-southwest of the Pentagon" when it "began a 330-degree turn. At the end of turn, it was descending through 2,200 feet".

Next we need to calculate the maximum radius (the most conservative case) of the arc that would allow the aircraft to transition from its downward path to level flight (while clearing obstacles in its path), and strike the Pentagon at the point described in official reports.



We chose instead to use the radius calculated by Pilots for 9/11 Truth.

Pilots for 9/11 Truth base their calculation on the Flight Data Recorder (FDR) data obtained pursuant to a Freedom of Information Act request filed with the National Transportation Safety Board, and carefully constructed topography of the area below the flight path.

Leaving aside the discrepancies between the official account of Flight 77, and the Flight Data Recorder (which NTSB refuses to answer), Pilots for 9/11 Truth calculated a radius equal to about 579 feet.

From this they calculated the force on the Boeing 757 at 34 Gs, i.e. 34 times the force due to gravity.

There has been some criticism of the calculations



performed by Pilots for 9/11 Truth, and they have answered their critics.

With mass, velocity, and radius equal to 255,000 lbs, 530 mph, and 579 feet respectively, the preceding formula yields force equal to 8,276,850 lbs, i.e. the Boeing 757 would act as if it had increased its weight by 8,276,850 lbs, or more than 32 times its normal weight.

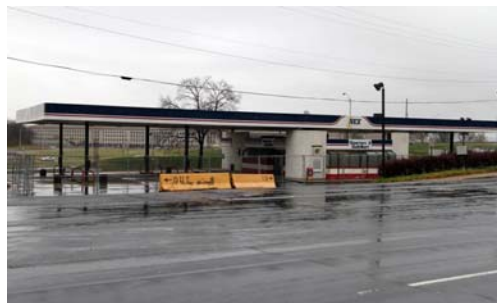
With a virtual weight of about 8.5 million pounds, Flight 77 could not have levelled off before striking the Pentagon. It would have crashed before it reached the Pentagon.

This fact alone is sufficient to refute the official account of "Flight 77."

Neither Hani Hanjour -- the alleged pilot trainee "noted for incompetence", nor the Boeing 757, would have been in any condition to fly with "the top of the fuselage of the aircraft no more than 20 ft above the ground" (Pentagon Building Performance Report, p14).

Pilots for 9/11 Truth did another calculation by lowering the height of "Flight 77" below that shown by the FDR. They lowered it to to the top of the Virginia Department of Transportation communications antenna that sits below the alleged flight path.

With this very conservative case, they calculated the force on the Boeing 757 at 11.2 Gs. "11.2 Gs was never recorded in the FDR. 11.2 Gs would rip the aircraft apart" they state.



Calculations by Frank Legge and David Chandler, Scientists for 9/11 Truth, do not take into account the 4-storey Navy Annex on the north side of Columbia Pike (its southeast corner is at an elevation of 124 feet) and the gas station and electric power line west of the Pentagon. These appear to be above their calculated flight path. Legge and Chandler do not provide data points for their and the government's alleged flight paths for us to critique.

Scientific, and other evidence, reinforce the conclusion: the official account of Flight 77 is false.

## **9/11 Facts, History — Not Propaganda**

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**"Evidence can prove a theory wrong**, by establishing facts that are inconsistent with the theory. In contrast, **evidence cannot prove a theory correct** because other evidence, yet to be discovered, may exist that is inconsistent with the theory."

"In the scientific search for truth there are no time limits and no point at which a final decision must be made." (Reference Manual on Scientific Evidence, p81)



Enver Masud, **"What Really Happened on September 11 at the Pentagon"**, The Wisdom Fund, March 7, 2005

Enver Masud, **"9/11 Unveiled"**, The Wisdom Fund (September 11, 2008)

Rob Balsamo, **"Arlington Topography, Obstacles Make American 77 Final Leg Impossible"**, Pilots for 9/11 Truth, December 12, 2008

Enver Masud, **"Why Was FMFD Unit 161 at the Pentagon Before the Crash of 'Flight 77'?"**, The Wisdom Fund, January 1, 2009

Rob Balsamo, **"North Approach Impact Analysis"**, pilotsfor911truth.org, January 2, 2010

**Rebuttal:** Frank Legge et al , **"What Hit the Pentagon?"**, journalof911studies.com, February 15, 2010

Dwain Deets, **"NASA Flight Director Confirms 9/11 Aircraft Speed As The 'Elephant In The Room'"**, Pilots for 9/11 Truth, June 22, 2010

WTC Aircraft Speed Analysis: **9/11: Speeds Reported For World Trade Center Attack Aircraft Analyzed** and **Evidence Strengthens To Support WTC Aircraft Speed Analysis**

Enver Masud, **"Pentagon Transcripts, Official Records Belie 'The 9/11 Commission Report'"**, The Wisdom Fund, September 11, 2010

Instructor/Airshow Pilot Questions 911 Scena...



"Instructor/Airshow Pilot Questions 911 Scenario," December 23, 2010



## G FORCES - Scene From 9/11: ATTACK ON T...



G

FORCES: Scene From 9/11 - Attack on the Pentagon, April 23, 2011

**MULTIMEDIA:** Enver Masud, "[9/11: The Pentagon](#)," The Wisdom Fund, June 15, 2012

[Gold Reef City's Tower of Terror . . . holds the record for most G-force on any roller coaster in the world, an intense 6.3G.--Elizabeth Alton, "[Top 7 Most Thrilling Roller Coasters in the World](#)," [entertainmentdesigner.com](#), February 12, 2014]

**MORE:** "[What Really Happened on September 11, 2001](#)," **The Wisdom Fund**





**Federal Aviation  
Administration**

# Acceleration in Aviation: G-Force



## Acceleration in Aviation: G-Force

Human beings are adapted to live and survive within the ever-present, accelerative force of gravity. While on earth, this is a constant, and we live and function with it from the day we are born until the day we die. As an infant learning to walk, we learn very quickly that a misstep will ultimately lead to a painful gravity-induced incident with the ground that we call “a fall.”

As we develop and start to solve problems, we learn that a cookie jar falling off the counter will accelerate all the way to floor with shattering results. Many hours of our youth are spent determining the results of gravity on spherical objects of various shapes and sizes to our advantage in competition. We became accustomed to gravity at the standard 1 “G-force.”

When we pilot an aircraft, all that we have learned about gravity and have become comfortable with suddenly changes. Flight—in its purest definition—is overcoming gravity to ascend through the air. Just as when we were learning to walk, a primary goal of every flight should be to avoid painful, gravity-induced incidents with the ground. These encounters are called aircraft accidents and mishaps, and they can be destructive, even fatal.





## What Goes Up Must Come Down

The force of gravity on earth causes a constant acceleration of 32 feet-per-second squared. An object in freefall will accelerate at an ever-increasing speed toward earth until it impacts the earth or reaches terminal velocity—the point at which the force of aerodynamic drag acting on the object overcomes the force of acceleration induced by gravity.

Acceleration is described in units of the force called “Gs.” A pilot in a steep turn may experience forces of acceleration equivalent to many times the force of gravity. This is especially true in military fighter jets and high-performance, aerobatic aircraft where the acceleration forces may be as high as 9 Gs. Air race pilots in a tight pylon turn also experience high G-forces, but the important thing to remember is that any aircraft operated in a maximum-performance profile will subject the pilot to acceleration that is greater than the 1 G acceleration encountered on the ground. Pilots need to understand this in to successfully master flying.



## Types of Acceleration

There are three types of acceleration. These types are Linear, Radial, and Angular Acceleration.

**Linear Acceleration**—reflects a change of speed in a straight line. This type of acceleration occurs during take-off, landing, or in level flight when a throttle setting is changed.

**Radial Acceleration**—is the result of a change in direction such as when a pilot performs a sharp turn, pushes over into a dive, or pulls out of a dive.

**Angular Acceleration**—results from a simultaneous change in both speed and direction, which happens in spins and climbing turns.

## G Forces

During flight, a pilot may experience a combination of these accelerations as a result of input to the flight controls. These accelerations induce G-forces on the body that may be described as Gx, Gy, and Gz.

$G_x$ —is described as force acting on the body from chest to back;  $+G_x$  is experienced, for example, during the take-off roll as the throttle is advanced. This is the force that pushes the pilot back into the seat as the aircraft accelerates.  $-G_x$  is described as force from back to chest, and it is encountered during landing as the throttle is closed. This force pushes the pilot forward into the shoulder strap.



Naval pilots flying from aircraft carriers feel the extremes of this type of G force. During a catapult launch, the aircraft accelerates to 160-plus mph in just under two seconds. During landing, the aircraft will decelerate to a complete stop in just a few feet. Carrier pilots have adapted and successfully functioned with these extreme Gs for decades.

$G_y$ —is a lateral force that acts from shoulder to shoulder, and it is encountered during aileron rolls. Aerobatic pilots routinely encounter this type of G force and can still safely and precisely maneuver their aircraft.

$G_z$ — is a gravitational force that is applied to the vertical axis of the body. If it is experienced from head to foot, it is termed (*positive*)  $+G_z$ . This happens when a pilot pulls out of a dive or pulls into an inside loop.  $-G_z$  (*negative*) travels from foot to head, and it is experienced when a pilot pushes over into a dive.

## Physiological Effects of High G Forces

Human beings are adapted for life at 1 G on the surface of the earth. In the aviation environment, any maneuver has the potential to expose the human body to more than 1+ G of acceleration force. This can be particularly hazardous for pilots in the  $G_z$  axis. This is a G force that acts from head to toe in the case of  $+G_z$  and from toe to head in the case of  $-G_z$ . As an aircraft enters into a high-speed, coordinated turn or begins the pullout from a steep dive, the pilot experiences  $+G_z$ . The heart and cardiovascular system must respond quickly to G acceleration to keep blood flowing to the brain and maintain consciousness. Physiological response to  $+G_z$  causes the heart to beat harder and faster with an increased





vascular tone to keep the blood flowing “northward” toward the head. If the physiologic response of the heart and vascular system does not keep pace with the rapid onset of the G forces, pilot performance will be degraded to the point where unconsciousness and inability to pilot the aircraft may ensue.

One of the first indications of impending disaster may be a progressive loss of vision as the aircraft enters the maneuver. The eyes are extremely sensitive to low blood flow, and if the vascular system cannot keep up with the onset of Gs, the retina will not be supplied with adequate blood. As arterial pressure in the eye falls below that needed for the retina, the pilot may notice a loss of peripheral vision (*tunnel vision*), which may then be followed by progressive degradation to a smaller visual field (*gun barrel vision*), which in turn may be quickly followed by *Gray Out* and *Blackout* of the visual fields. If the rapid onset of G forces continues, the end result may be G-induced loss of consciousness (GLOC). In this condition, unless the aircraft has sufficient altitude for the pilot to back off the Gs and recover vision and/or consciousness, the result can be tragic. This has been the cause of far too many military and civilian aviation fatalities.



The symptoms that result from high G exposure are dependent on the rate of onset of the acceleration. When the onset is gradual (about 0.1 G per sec.), visual symptoms precede GLOC. If the onset is rapid (1 G per second or more), GLOC can occur without visual warning.

While the effects of +Gz can be profound, the human body is even less well equipped to handle -Gz, which is described as a foot-to-head force and is encountered when a pilot pushes over into a dive or enters an outside loop. Under -Gz, the blood is prevented from flowing back down the jugular veins into the heart, but the arterial blood flow to the head is enhanced. Once again,

the retina of the eye is extremely sensitive, and the visual effect is a loss of vision due to “Red Out.” If the pilot does not back off the control pressure, loss of consciousness will ensue in short order because the blood does not flow through the brain. To survive in an aviation environment, pilots must respect the laws of acceleration.

## **OK....What Does This Mean to Me?**

Any aircraft, civilian or military, can expose the pilot, crew, and passengers to forces in excess of 1 G. During steep turns and unusual attitude recovery, civil aviation pilots can experience high G forces that may take them by surprise unless they are prepared. Subsequently, all aviators need to understand what makes their body more resistant to the effects of G acceleration. Conversely, aviators need to understand those conditions that will make their body more susceptible to the effects of G forces. The bottom line is that G tolerance for each individual aviator may fluctuate from day to day, and this can lead to disastrous consequences in flight. This is one of the reasons that military pilots do a “G warm-up” maneuver prior to flying high-performance aircraft—it allows them to assess their own body and how well they will be able to tolerate the high-G environment.



### **The Bad Things**

G tolerance is degraded as a result of alcohol, fatigue, and dehydration, which are often associated with a social event. With the “Big Three” above, the aviator may experience severe symptoms of G exposure at much less than the customary level. Lack of physical conditioning and a sedentary lifestyle can also degrade G tolerance and increase the aviator’s susceptibility. Also, once again, smoking and flying do not mix. Individuals who smoke have diminished performance at high altitude and

high-G environments. Flying is difficult—do not make it harder by needlessly abusing your body.

### **The Good Things**

Most civilian aircraft are not equipped to handle G-protective clothing—a “G suit.” However, there are other things that can be done to enhance aviator performance in the high-G environment. A well-rested, hydrated, and fit aviator will physically be able to withstand higher G forces. When an aviator is well hydrated, there is more circulating volume in the blood stream, and it is easier for the heart to keep the brain perfused with oxygenated blood.



A regular program of conditioning that includes a mix of aerobic exercise coupled with resistance weight training will increase an aviator's resistance to the effects of Gs. (All exercise programs should be physician-approved prior to the initiation of training.) Training that is only aerobic in nature (jogging and swimming, for example) may lower the aviator's heart rate to the point where it does not accelerate fast enough to compensate for the effects of Gs. The combination of aerobic and resistance weight training enhances the response to G forces and adds a layer of protection that is not present in aerobic conditioning alone.

## **The Anti-G Straining Maneuver**

Another technique for dealing with G forces is the anti-G straining maneuver. This is a physical technique where the aviator pushes air out of the lungs against a closed glottis, while simultaneously contracting the muscles in the calves, thighs, and shoulders. This resistance inhibits the blood from flowing away from the brain, and it simultaneously increases the pressure in the carotid arteries. This maneuver is practiced by military pilots, and it can increase G-tolerance. To avoid injury, however, it should not be attempted at 1 G with 100% effort.



## **Respect**

Aviators need to respect G acceleration just as they respect other aspects of flight. Proper flight planning will take a number of things into account, such as weather, fuel, distance, and time. A smart aviator will also include consideration of the G forces for the aircraft and all aboard when it comes to flight planning. A healthy respect, training, and planning will help to avoid possible encounters with the ground.

## **MEDICAL FACTS FOR PILOTS**

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